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THE MALAGASY SPECIES OF THE CREVICE WEAVER GENUS *ANDOCHARANO* (ARANEAE: FILISTATIDAE)

IVAN L. F. MAGALHAES¹ AND CRISTIAN J. GRISMADO¹

ABSTRACT. The Malagasy species of the filistatid spider genus *Andoharano* Lehtinen are revised. The four previously known species, all from caves, are redescribed and have their type material illustrated. The paratypes of *A. milloti* Legendre are not conspecific with its holotype and are herein described as *A. rollardae* sp. nov. The first epigean representatives of the genus on the island are recorded, and a further six species are described: *A. simoui* sp. nov., *A. zonsteini* sp. nov., *A. woodae* sp. nov., *A. lehtineui* sp. nov., *A. griswoldi* sp. nov., and *A. ramirezi* sp. nov. Interestingly, each of the species occurring in caves is morphologically similar to a different epigean species, suggesting repeated invasions of the subterranean realm. The fine morphology of the genus is illustrated, including the first scanning electron microscopy images of genitalia, spinnerets, and other structures.

Key words: Africa, Madagascar, New Species, Prithinae, Spider, Taxonomy

INTRODUCTION

The spider genus *Andoharano* Lehtinen was erected to accommodate two Malagasy species then placed in the Eurasian genus *Filistata* Latreille (Lehtinen, 1967): *F. grandidieri* Simon 1901 and *F. decaryi* Fage 1945. Later, additional species have been described from Madagascar (Legendre, 1971) and from Namibia (Zonstein and Marusik, 2015), and currently the genus includes five species (WSC, 2018). Upon its original description, Lehtinen (1967) noted this was a “highly deviant genus.” However,

it remains very poorly studied, as virtually nothing is known about it except for the original descriptions of its species. Gray (1995) suggested *Andoharano* is a close relative of the mainland African genus *Afrofilistata* Benoit, a relationship purportedly supported by characters of the male palp. However, the poor taxonomy of the genus and the lack of knowledge of its basic morphology hamper a more conclusive hypothesis for its phylogenetic placement.

Four of the known species of *Andoharano* come from Madagascar, all from caves. Unfortunately, their original descriptions lack useful illustrations allowing their recognition, and the type species of the genus has never been illustrated (Simon, 1901; Fage, 1945; Legendre, 1971). On the other hand, the examination of a series of collections of Malagasy spiders deposited mainly in the California Academy of Sciences revealed the genus was not only more diverse than previously known, but that it is also represented by several hitherto undescribed epigean species. Thus, the aims of this contribution are: 1) to redescribe and illustrate the previously known species of Malagasy *Andoharano* based on the examination of type material, 2) describe new taxa, especially of the epigean fauna, and 3) provide data on the general morphology of the genus for a better understanding of its phylogenetic placement.

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MATERIALS AND METHODS

Specimens for this study come from the following institutions: CAS—California Academy of Sciences (San Francisco, USA); MCZ—Museum of Comparative Zoology, Harvard University (Cambridge, Massachusetts, USA); MNHN—Muséum National d'Histoire Naturelle (Paris, France); MRAC—Musée Royal de l'Afrique Centrale (Tervuren, Belgium). Complete voucher and locality data for all specimens examined in this study are given in Supplementary Table 1.²

The format of description, including notation of leg macrosetae, follows Magalhaes and Ramírez (2017). All measurements are in millimeters. Female internal genitalia were examined after digestion using a pancreatin solution. For imaging, they were placed in lactic acid in temporary slides and photographed under an Olympus BH2 transmitted light microscope; drawings were made with a camera lucida. Male palps of some species were cleared in clove oil. Measurements and photographs of habitus and male palps were made with a Leica M165C stereoscopic microscope using Leica Application Suite 3.8. All stacked-focus images were processed in Helicon Focus 6.8 (<https://www.heliconsoft.com>). Specimens were prepared for scanning electron microscopy as described in Magalhaes and Ramírez (2017), and all images were taken in a Philips FEI XL 30 TMP scanning electron microscope at Museo Argentino de Ciencias Naturales, Buenos Aires.

RESULTS AND DISCUSSION

The study of the new specimens allowed us to recognize at least seven undescribed species of *Andoharano*, elevating the total from four to 11 species in Madagascar. Filistatids are more diverse in subtropical,

arid, and semiarid regions (Gray, 1995; Magalhaes and Ramírez, 2017; WSC, 2018). Madagascar has a wide range of habitats, including more humid habitats and rainforests in the eastern side and a drier portion in the west, mainly due to the rain shadow of the highlands in the central portion of the island. As a consequence, *Andoharano* seems to be restricted to the dry portions of the island, mainly in the tropical dry forests in the north and the spiny forests and xeric shrublands in the southwest (Fig. 1). Their apparent absence in the tropical dry forests in the western portion of the island (e.g., in Mahajanga) is puzzling and may be due to a sampling bias.

Interestingly, we here describe epigean representatives that bear morphological resemblance to the previously known cave species. For instance, *Andoharano decaryi*, *A. rollardae*, and *A. grandidieri* are very similar to *A. simoni*, *A. griswoldi*, and *A. lehtineni*, respectively, mainly in their genital morphology. The cave species are usually paler and have relatively longer appendages than their epigean counterparts, suggesting some degree of troglomorphy. Furthermore, if the morphological resemblance was to indicate that species in each of these three pairs are sister taxa, this would mean that *Andoharano* invaded the subterranean habitat more than once in their evolutionary history. This hypothesis could be eventually tested with a densely sampled phylogeny of the genus that is beyond the scope of this paper.

The morphological details of representatives of *Andoharano* unveiled during the course of this study hint at the phylogenetic placement of the genus. Gray (1995) suggested *Andoharano* is closely related to *Afrofilistata* due to the possession of a “lozenge-shaped cymbium.” The cymbium in *Andoharano* is indeed small when compared with that of other filistatid genera and has a convex margin that could be interpreted in that way. However, the cymbium in *Afrofilistata* is horseshoe-

² Supplementary material referenced in this paper is available online at www.mcz.harvard.edu/Publications/.

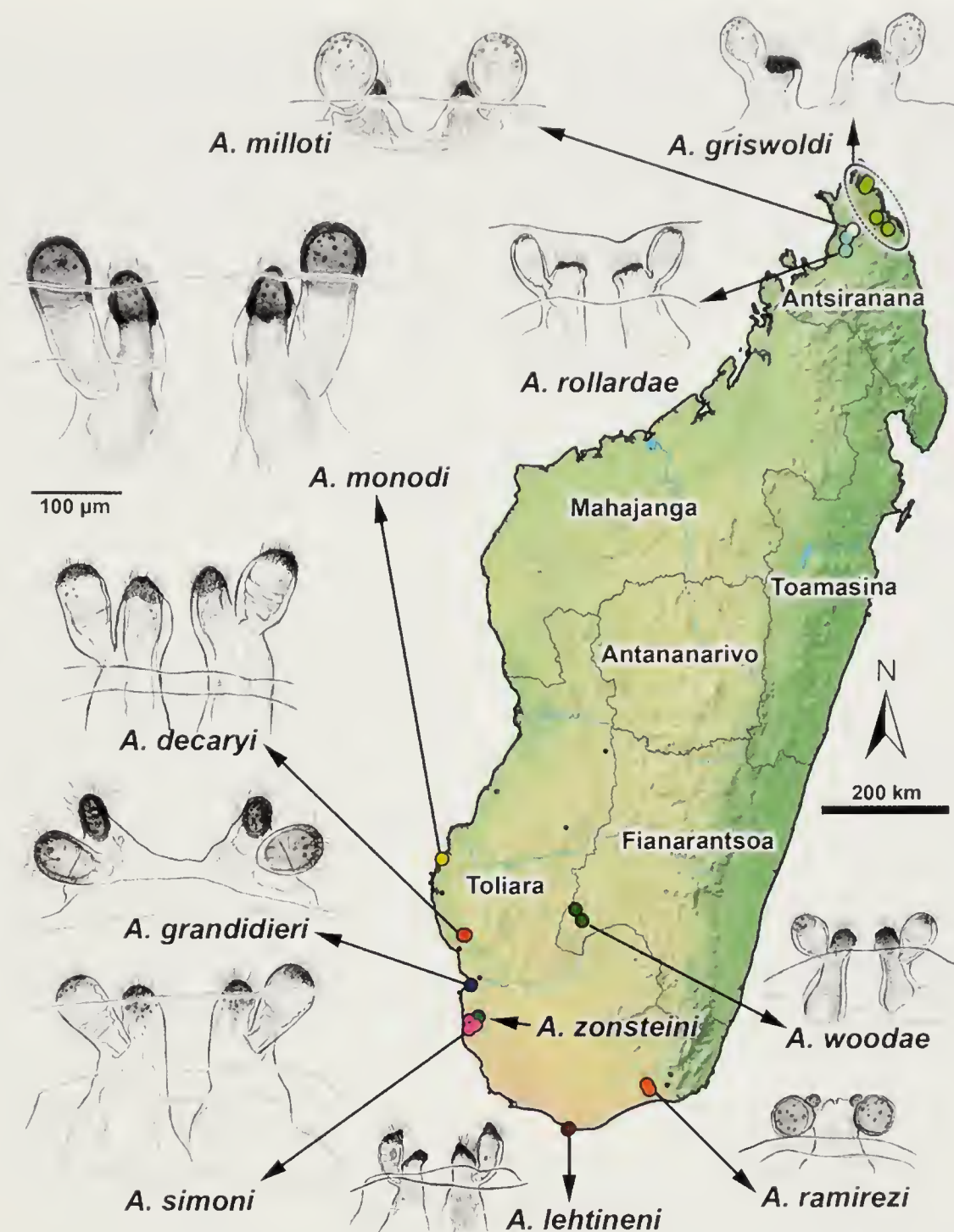


Figure 1. Distribution map of *Andoharano* species in Madagascar. Drawings of female spermathecae in dorsal view, all to scale.

shaped, and this genus lacks aciniform gland spigots (Magalhaes, unpublished data), characters that would instead ally it with *Pritha* Lehtinen and its relatives. We here show that *Andoharano* presents true feathery setae and a strong retrolateral condyle in the metatarsus II of males, characters shared among the Prithinae only with New World genera (e.g., *Pikelinia* Mello-Leitão and *Antilloides* Brescovit, Sánchez-Ruiz & Alayón). The pattern of coloration of the carapace, with a dark hourglass-shaped band extending from the eyes to the

posterior end of the carapace and lacking submarginal bands, is also reminiscent of that of *Antilloides* and *Filistatoides* F.O. Pickard-Cambridge. This might suggest that *Andoharano* has affinities with the New World fauna, with puzzling biogeographic implications.

SYSTEMATICS

Filistatidae Ausserer, 1867
Andoharano Lehtinen, 1967

Andoharano Lehtinen, 1967: 214. Type species by original designation *Filistata decaryi* Fage, 1945

Diagnosis. This genus can be easily distinguished from all Old World filistatids by the presence of true feathery setae (Fig. 2A). Both males and females usually present an hourglass-shaped brown band extending from the eye region to the posterior end of the carapace (Fig. 12; absent in some species). Males can be further distinguished by the small cymbium with a straight anterior margin and bearing a retrolateral forelock of long setae that run along with the bulb (Figs. 9E, 41D) and by the shape of the sperm duct, which makes a strong backwards curve in the last section (Fig. 8). Females possess a large fan-shaped seta in the posterior median spinnerets (Figs. 6D, E, 7E) (convergent in some other prithine genera). The shape of the outer spermathecae (elongate, drop-shaped, widest distally, with pores restricted to apical portion; Figs. 11D, 14) is typical of this genus, but some species (*A. ansieae*, *A. ramirezi*) have rounded spermathecae.

Description. Size: small spiders, ranging from 1.82 (*A. ramirezi* male) to 6.7 mm (*A. decaryi* female) in total length (appendages excluded). Color and pattern: carapace, sternum, labium, and appendages pale yellow to yellowish brown. Carapace usually with dark brown hourglass-shaped band extending from the eye region to the posterior end of the carapace; submarginal bands absent; dark brown lining on sides of carapace present or absent. Sternum lightly colored, occasionally with brown pigment on anterior margin. Chelicerae with an anterior brown patch. Legs usually with brown annulations, three on the femora and two on the tibiae and metatarsi; annulations sometimes lacking, especially in cave-dwelling species. Abdomen with well-defined chevron-like pattern, usually with around six markings; ventral side lightly colored, with bands alongside spinnerets. Prosoma:

carapace longer than wide, thoracic fovea absent. Clypeus slightly notched in males. Eyes united in a low tubercle, anterior median eye subequal to the anterior lateral eye. Eye apodemes absent (Fig. 2B). Feathery setae present (Figs. 3C, 4F), white setae absent. Sternum slightly longer than wide; sigilla difficult to observe but detectable under SEM, a single posterior pair (Fig. 2D). Cheliceral gland slightly raised (Figs. 3B, 4D). Female palp tarsal macrosetae absent. Leg formula 1423. Femora, metatarsi, and tarsi macrosetae absent. Tibiae macrosetae usually absent, but present in the tibiae I of males of some species. Male tarsi entire. Trichobothria with ring-like socket present in tibiae and metatarsi, in the last case, reaching the distal end of the article (Fig. 4G). Male metatarsus II bearing a strong retrolateral condyle, with modified metatarsus stopper, and apparently lacking a tarsal socket (Fig. 17F); in *A. ramirezi*, with a retrolateral excavation (Fig. 41H). Calamistrum sessile, in some species with numerous setae, composed of three parallel rows; teeth present in all setae (Figs. 3F, G, 4I–K). Abdomen suboval. Posterior respiratory system lacking lateral tracheae or transverse duct (Fig. 5). Anal tubercle unmodified. Spinnerets (Figs. 6, 7): cribellum divided, with each spinning field very wide, cribellum spigots strobilate. Anterior lateral spinnerets (ALS) with anterior row of setae, one major ampullate gland spigot on the anterior margin, and about 15–35 piriform gland spigots. Posterior median spinnerets (PMS) flattened, with spatulate setae, a large fan-shaped seta medially, and one aciniform gland spigot, one minor ampullate gland spigot, and one paracribellar gland spigot. Posterior lateral spinnerets (PLS) with around 10–20 aciniform gland spigots, and a longer spigot probably serving the paracribellar gland. Male genitalia (Figs. 8, 9): palpal femur straight, unarmed. Palpal tibia incrassate or, more commonly, subconical, widest distally; in all species, except for *A. ramirezi* and *A.*

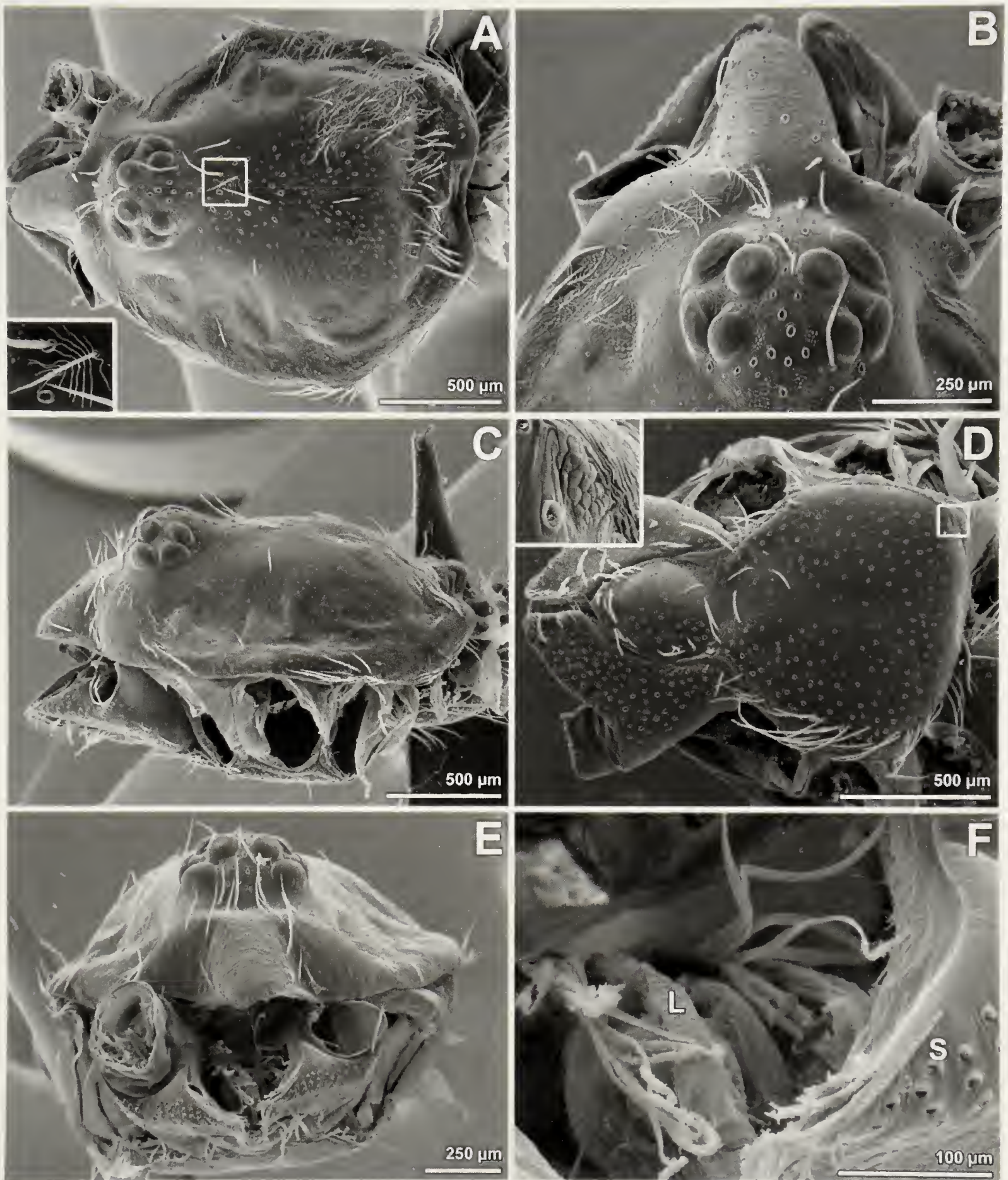


Figure 2. *Andoharano simoni* sp. nov., female from Madagascar, Toliara, Eloetse (CAS 9014032), cephalothorax. A. Dorsal. Inset showing feathery seta. B. Eye region, dorsal. C. Lateral. D. Ventral. Inset showing sternum sigillum. E. Anterior. F. Anterior, detail of labrum and left serrula. Abbreviations: L = labrum, S = serrula.

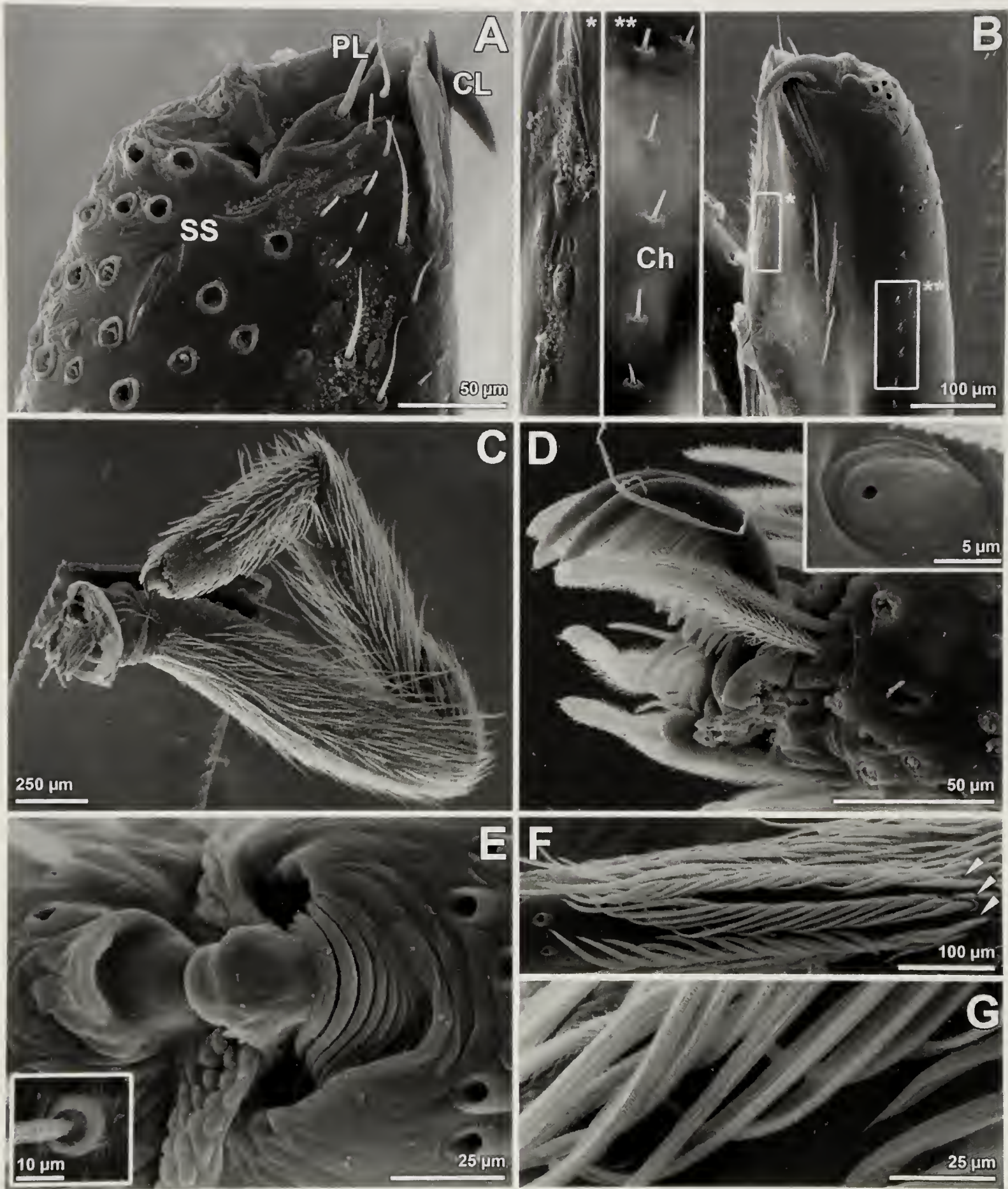


Figure 3. *Andoharano simoni* sp. nov., female from Madagascar, Toliara, Eloetse (CAS 9014032), appendages. A. Left chelicera, anterior. B. Same, posterior. Insets showing chelicera gland and row of chemosensory setae. C. Left palp, retrolateral. D. Left leg I, claws, retrolateral. Inset showing tarsal organ IV, retrolateral. E. Left leg IV, metatarsus stopper, dorsal. Inset showing trichobothrium on metatarsus I. F. Left calamistrum, arrows to each of the three rows. G. Calamistrum setae, detail. Abbreviations: CL = apex of cheliceral lamina, Ch = chemosensory seta, PL = promarginal lobe, SS = slit sensilla.

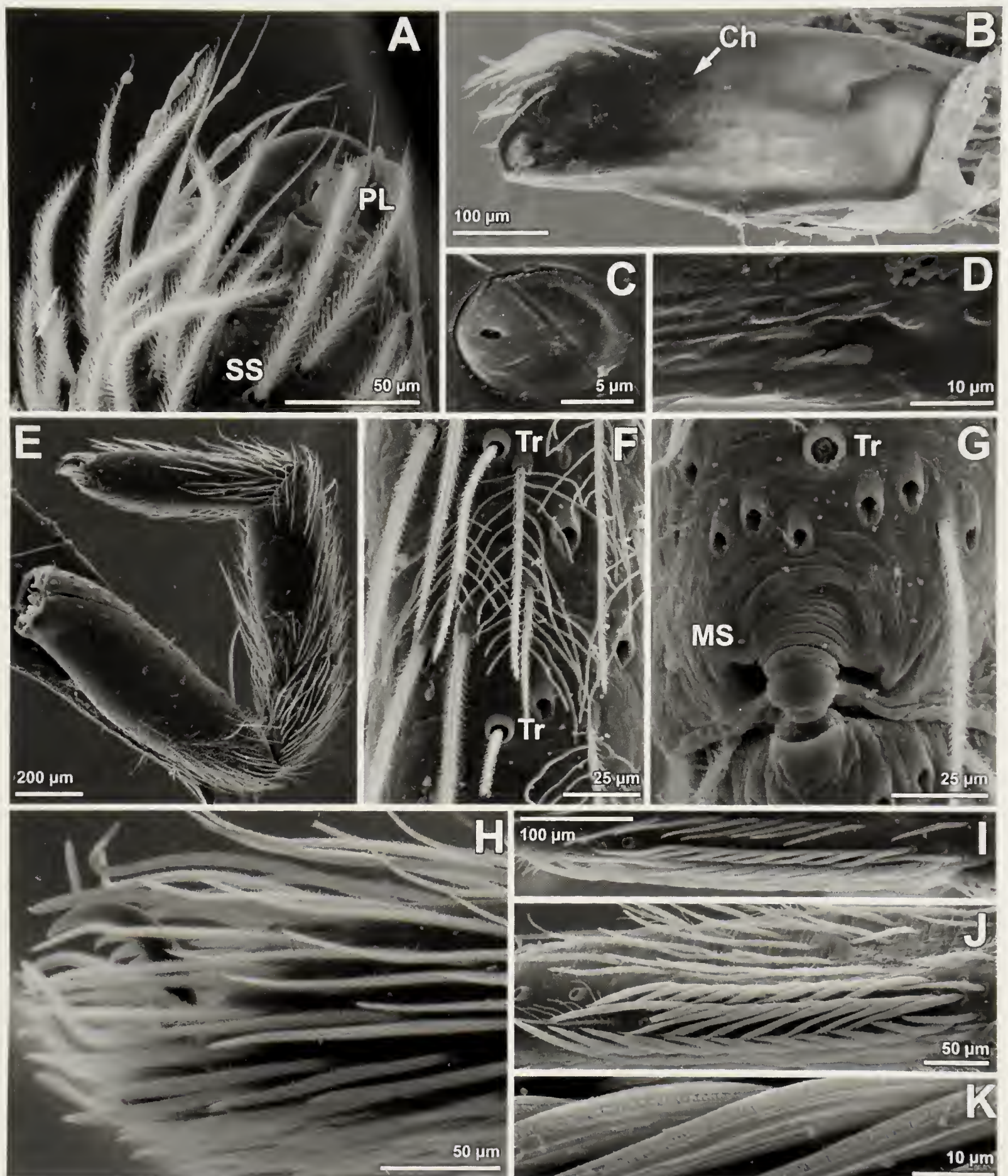


Figure 4. *Andoharano griswoldi* sp. nov., female from Madagascar, Antsiranana, Montagne des Français (CAS 9000850), appendages. A. Left chelicera, anterior. B. Same, posterior. C. Palpal tarsal organ, retrolateral. D. Chelicera gland. E. Left palp, retrolateral. F. Metatarsus I, dorsal, detail of trichobothria and feathery setae. G. Left leg I, metatarsus stopper, dorsal. H. Tarsal claws IV, retrolateral. I. Left calamistrum, dorsal. J. Same, retrolateral. K. Detail of calamistrum setae. Abbreviations: Ch = chemosensory seta, MS = metatarsus stopper, PL = promarginal lobe, SS = slit sensilla, Tr = trichobothria.

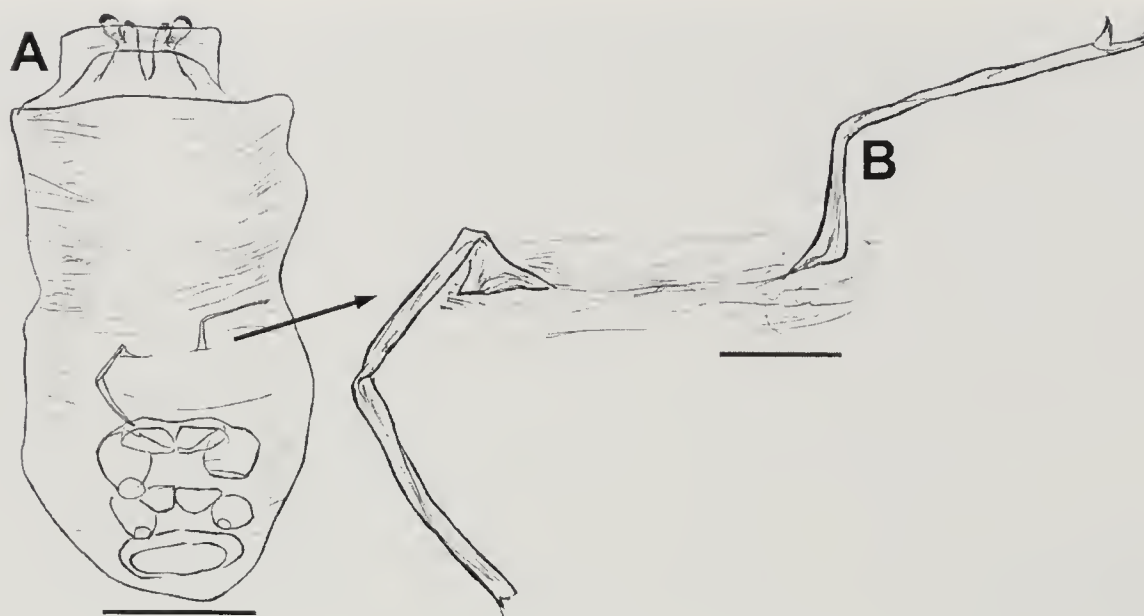


Figure 5. *Andoharano simoni* sp. nov., female paratype (MCZ 54669), cleared abdomen showing spermathecae and posterior tracheae, dorsal view. Scale bars = 0.5 mm (A) or 0.1 mm (B).

ansieae, with strong apical setae on the ventral side. Cymbium short, with straight anterior margin, bearing a forelock of long setae that run parallel to the bulb. Bulb drop-shaped to trapezoidal. Paraembolic lamina absent. Embolus straight to curved, retrolaterally bent; small slit present in the retrolateral side; keel absent. Sperm duct with a double coil, the second one not complete; a strong backwards curve is present in the last section. Fundus pointing ventrally. Basal bulb sclerite flattened; the tendon of the claw flexor muscle (tM29) attaches dorsally. Female genitalia (Figs. 10, 11): external region unsclerotized, with dark, strong pubescence. Interpulmonary fold with straight anterior margin and subsquarish corners. Uterus externus membranous. Spermathecae: two pairs present (except for *A. ansieae*, apparently with a single spermatheca); the inner pair subtriangular to flattened apically, the outer one usually elongate, drop-shaped (except in *A. ramirezi* and *A. ansieae*, rounded), with pores restricted to the apical portion on a slightly more sclerotized sector that appears darker in light microscope.

Composition. Twelve species: *Andoharano grandidieri* (Simon, 1901); *A. decaryi* (Fage, 1945); *A. milloti* Legendre, 1971; *Andoharano monodi* Legendre, 1971; *A.*

ansieae Zonstein & Marusik, 2015; *A. griswoldi* sp. nov.; *A. lehtineni* sp. nov.; *A. ramirezi* sp. nov.; *A. rollardae* sp. nov.; *A. simoni* sp. nov.; *A. woodae* sp. nov.; *A. zonsteini* sp. nov.

Distribution. The 11 species treated in this contribution are endemic to the dry portions of Madagascar. An additional species has been described from Namibia by Zonstein and Marusik (2015), and details of the male palp indicate it indeed belongs to the *Andoharano* lineage (see “Internal Relationships and Monophyly” section below). Because the filistatid fauna of mainland Africa has never been revised and is severely undersampled, we would expect additional species of the genus to be discovered in new localities in the future.

Internal Relationships and Monophyly. Most Malagasy species of the genus have a rather uniform morphology and are similar to *A. decaryi*, the generotype. At least two character states are shared by these species (and not by other filistatid genera): the presence of incrassate setae in the venter of the male palpal tibia (Fig. 27) and the drop-shaped outer spermathecae with pores restricted to its apical portion (Fig. 11). However, two species deviate from this general pattern and lack these two character states: *A. ramirezi* (from southern Mada-

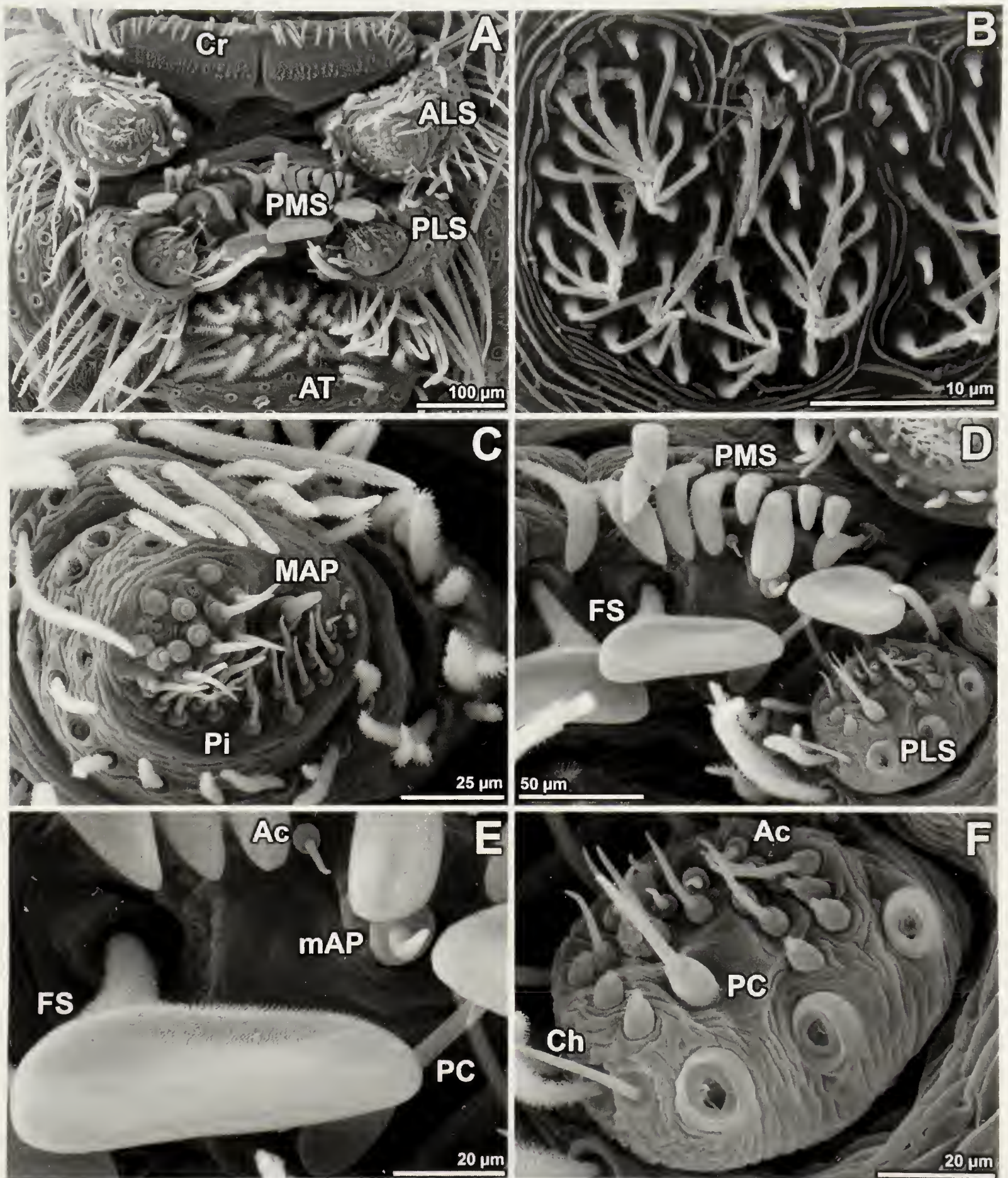


Figure 6. *Andoharano simoni* sp. nov., female from Madagascar, Toliara, Eloetse (CAS 9014032). A. Spinnerets, ventral. B. Cribellum spigots, ventral. C. Right ALS, ventral. D. Left PMS and PLS, ventral. E. Left PMS, ventral. F. Left PLS, ventral. Abbreviations: ALS = anterior lateral spinnerets, AT = anal tubercle, Ch = chemosensory seta, Cr = cribellum, FS = fan-shaped seta, MAP = major ampullate gland spigot, mAP = minor ampullate gland spigot, PC = paracribellar gland spigot, Pi = piriform gland spigot, PLS = posterior lateral spinnerets, PMS = posterior median spinnerets.

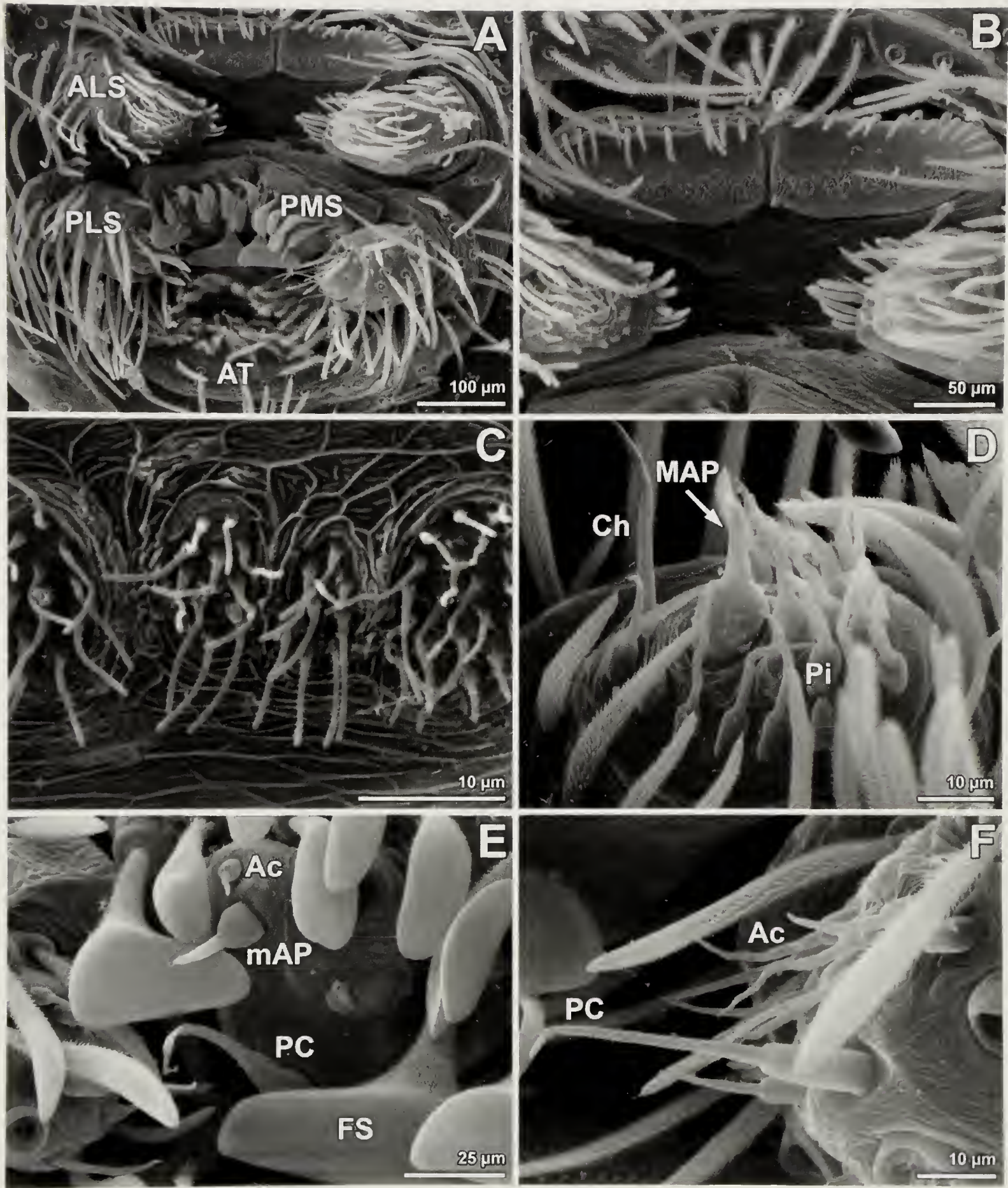


Figure 7. *Andoharano griswoldi* sp. nov., female from Madagascar, Antsiranana, Montagne des Français (CAS 9000850). A. Spinnerets, ventral. B. Cribellum, ventral. C. Cribellum spigots. D. Left ALS, ventral. E. Right PMS, ventral. F. Left PLS, ventral. Abbreviations: ALS = anterior lateral spinnerets, AT = anal tubercle, Ch = chemosensory seta, Cr = cribellum, FS = fan-shaped seta, MAP = major ampullate gland spigot, mAP = minor ampullate gland spigot, PC = paracribellar gland spigot, Pi = piriform gland spigot, PLS = posterior lateral spinnerets, PMS = posterior median spinnerets.

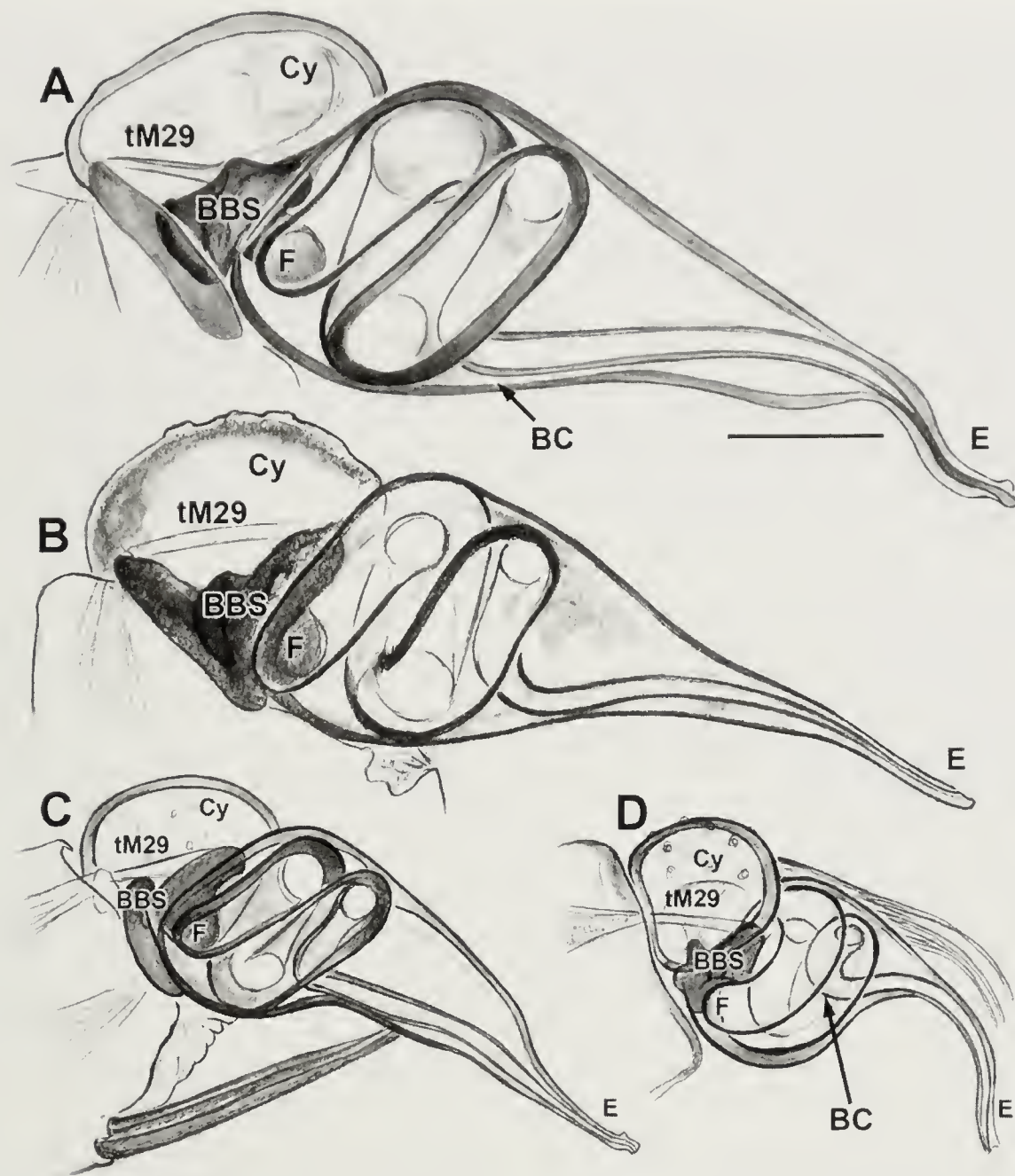


Figure 8. *Andoharano* spp., male left bulbs (except A, right, mirrored), clove oil cleared. A. *Andoharano simoni* sp. nov., male holotype (CAS 9014032). B. *Andoharano grismoldi* sp. nov., male holotype (CAS 9060644). C. *Andoharano lehtineni* sp. nov., male holotype (CAS 9014164). D. *Andoharano ramirezi* sp. nov., male holotype (CAS 9014447). Scale bar = 0.1 mm. Abbreviations: BBS = basal bulb sclerite; BC = backward coil of the sperm duct; Cy = cymbium; E = embolus; F = fundus; tM29 = tendon of the claw flexor muscle.

gascar) and *A. ansieae* (from Namibia). *Andoharano ramirezi* shares some putative synapomorphies with the remaining Malagasy species, including the attachment of the palpal tendon to the dorsum of the basal bulb sclerite (Fig. 8), a strong retrolateral condyle in the male metatarsus II (Fig. 30F), and a fan-shaped seta in the posterior median spinnerets (Figs. 6E, 7E). This suggests *A. ramirezi* might be the sister group to all remaining Malagasy species. The Namibian *A. ansieae* shares two putative synapomorphies with Malagasy repre-

sentatives: a seta forelock in the male cymbium and a backwards coil in the sperm duct (Zonstein and Marusik, 2015, fig. 9). On the other hand, its female genital structure is quite different, with a single pair of receptacles (Zonstein and Marusik, 2015, figs. 11, 12), and details of internal palpal structures, legs, and spinnerets are not available in the original description, so the states of some of the characters mentioned above are currently unknown in this species. Although a test of the monophyly of the genus is beyond the scope of

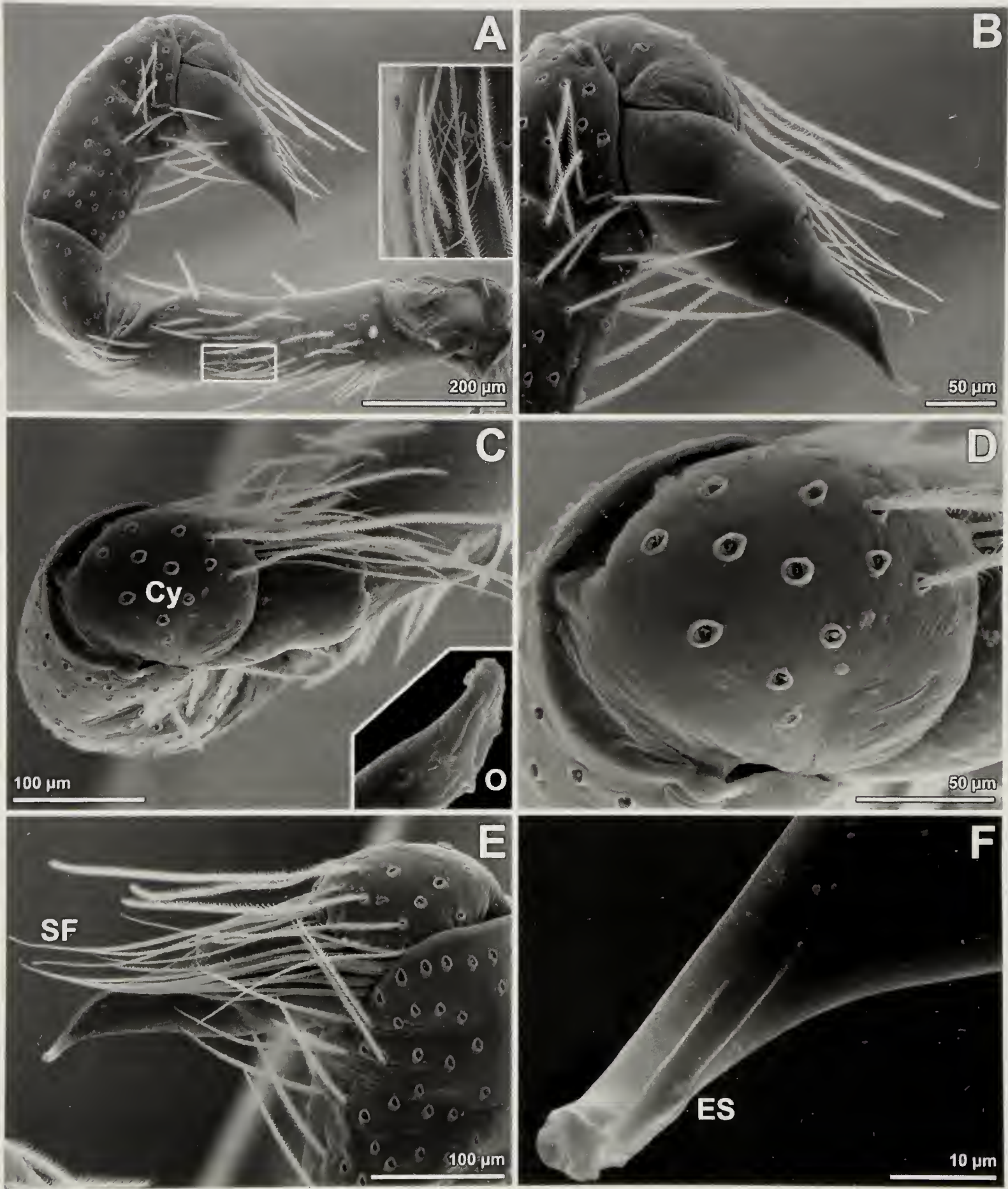


Figure 9. *Andoharano zonsteini* sp. nov., male paratype (CAS 9014583), left palp. A. Prolateral. Inset showing feathery seta. B. Bulb, prolateral. C. Bulb, dorsal. D. Cymbium, dorsal. E. Bulb, retrolateral. F. Embolus, retrolateral. Abbreviations: Cy = cymbium, ES = embolus slit, SF = retrolateral setae tuft.

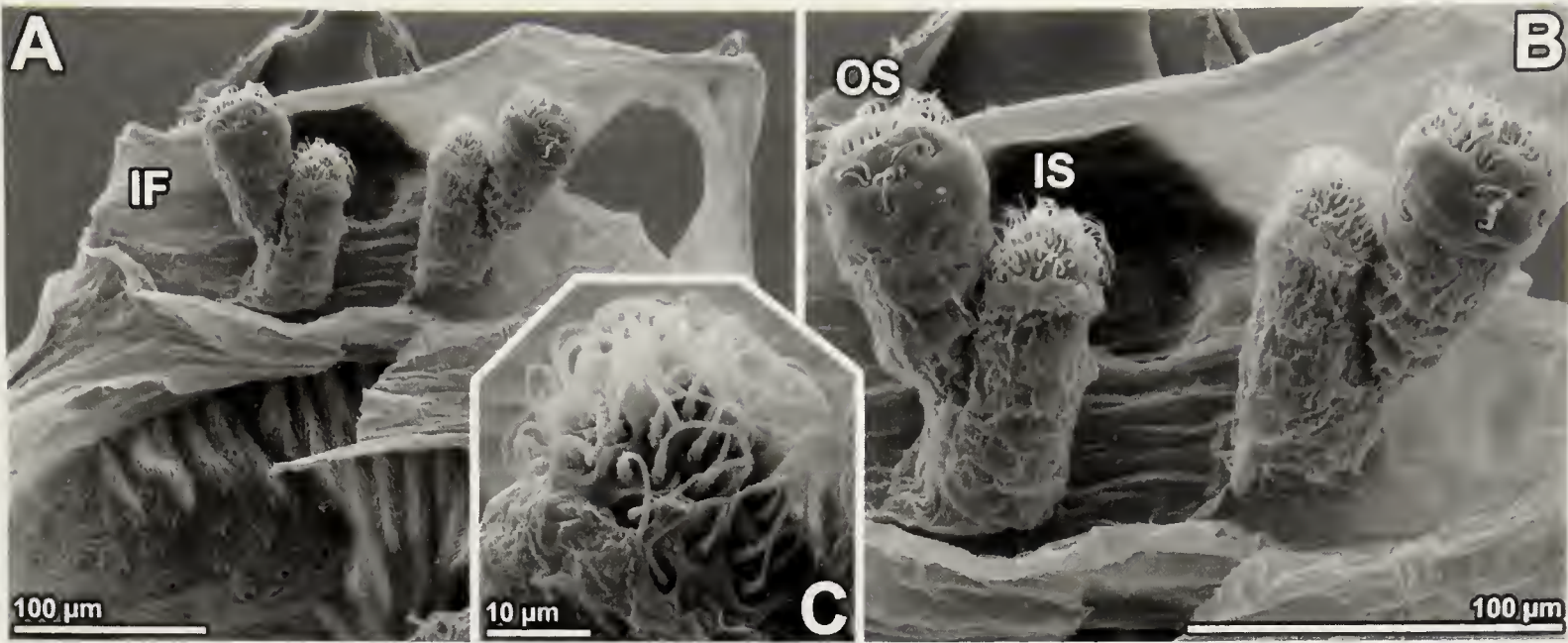


Figure 10. *Andoharano simoni* sp. nov., female from Madagascar, Toliara, Eloetse (CAS 9014032). A, B. Spermathecae, ventral. C. Right inner spermathecae, ventral. Abbreviations: IF = interpulmonary fold, IS = inner spermathecae, OS = outer spermathecae.

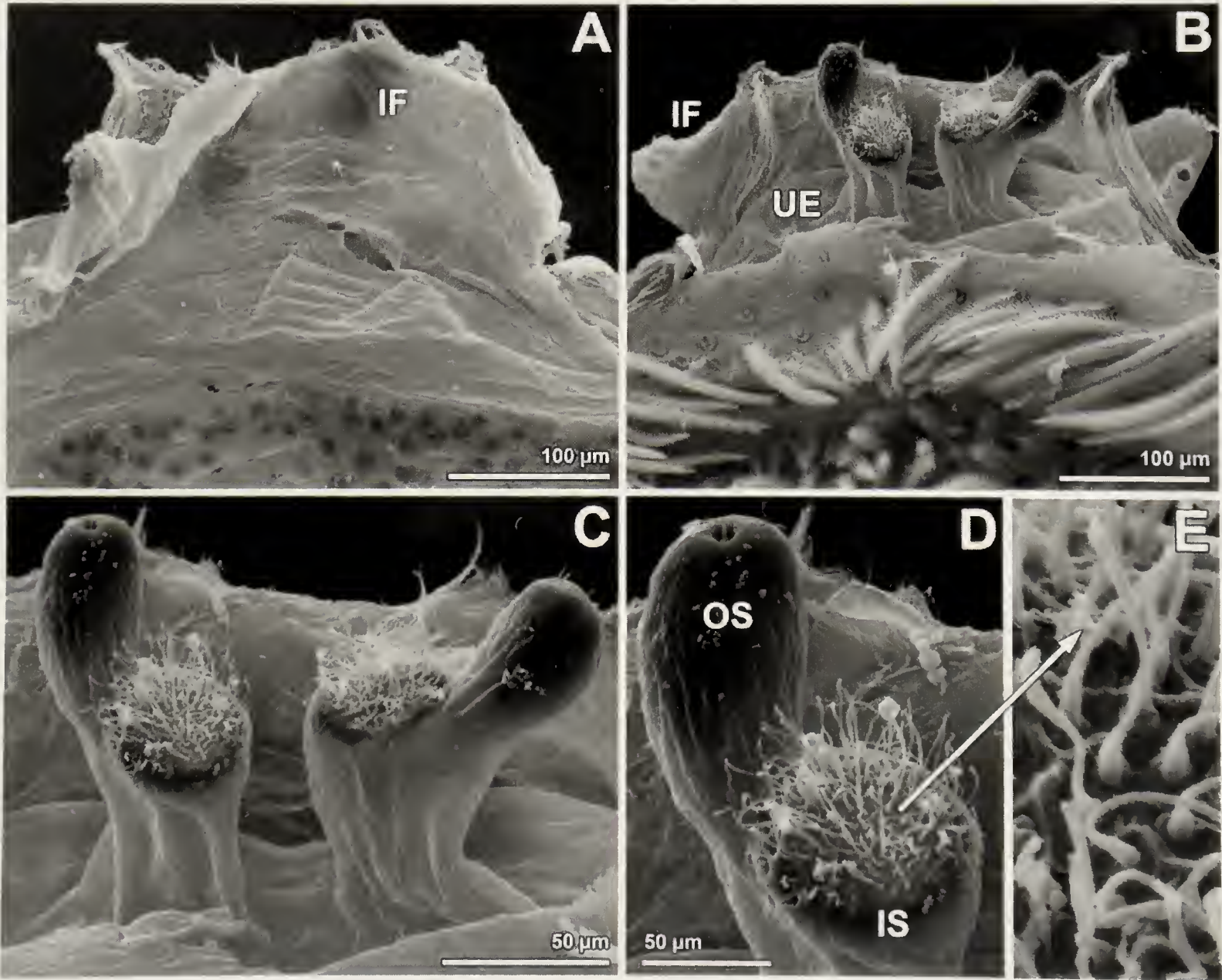


Figure 11. *Andoharano grismoldi* sp. nov., female from Madagascar, Antsiranana, Montagne des Français (CAS 9000850), spermathecae. A. Dorsal. B, C. Ventral. D. Detail of left spermathecae, ventral. E. Detail of glandular pores. Abbreviations: IF = interpulmonary fold, IS = inner spermathecae, OS = outer spermathecae, UE = uterus externus.



Figure 12. *Andoharano decaryi* (Fage, 1945), habitus. A–C. Male (syntype?) (MNHN AR 5466). A. Dorsal. B. Lateral. C. Ventral. D–F. Female lectotype (MNHN AR 5467). D. Dorsal. E. Ventral. F. Lateral. Scale bars = 1 mm.

this contribution, the aforementioned characters suggest it is safe to assume that *Andoharano* as currently delimited is potentially a monophyletic assemblage.

Andoharano decaryi (Fage, 1945)
Figures 1, 12–14

Filistata decaryi Fage, 1945: 301

Andoharano decaryi: Lehtinen, 1967: 214.
Legendre, 1971, fig. 4

Lectotype (here designated). **MADAGASCAR. Toliara:** Grotte d'Andoharano, 1 ♀ in the same vial as 7 imm. paralectotypes (here designated) (MNHN AR5467). Literal label: MUSEUM PARIS AR 5467 | *Filistata*

decaryi Fage | TYPES- Madagascar: grotte d'Adoharano.

Putative Syntype. MADAGASCAR. Toliara: Grotte de Narmoroka [22.83315°S, 43.70023°E], 1 ♂ (MNHN AR5466). Literal label: MUSEUM PARIS AR 5466 | *Filistata decaryi* Fage | ♂ TYPE | Madagascar: grotte de Narmoroka.

Remarks. The original description of Fage did mention one male and nine females from Andoharano cave; however, the only vial with this collection data we found in the MNHN collection (AR 5467) currently contains only one female and seven immatures, labeled as “types.” The only male deposited in that collection (with

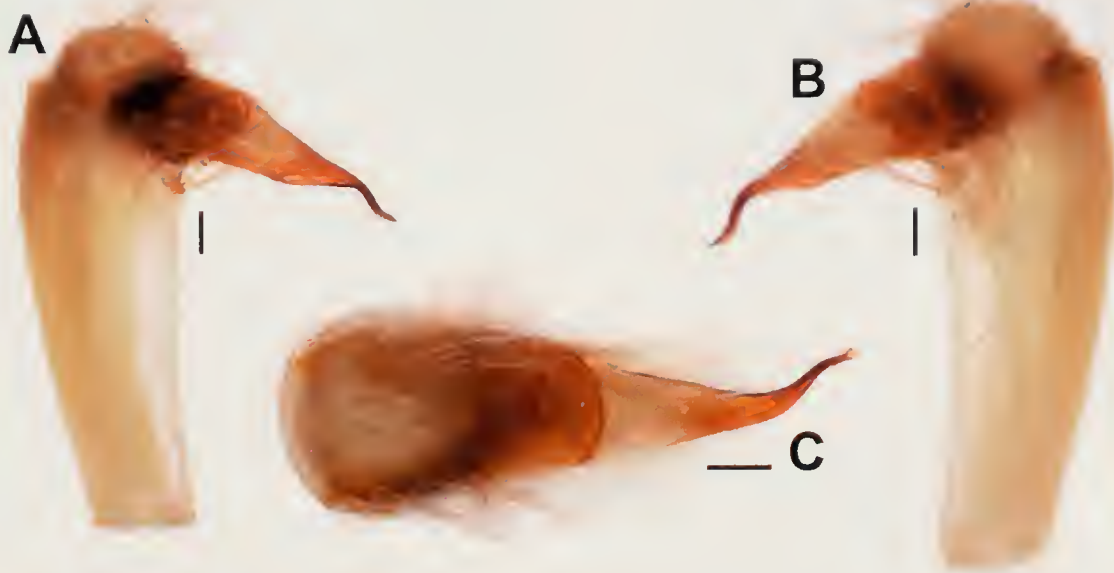


Figure 13. *Andoharano decaryi* (Fage, 1945), male (syntype?) (MNHN AR 5466), right palp, mirrored. A. Prolateral. B. Retrolateral. C. Bulb, dorsal. Scale bars = 0.1 mm.

the number AR 5466) is labeled as coming from Narmoroka cave and also bears a legend “type.” Although the labels are not the originals (as occurs with many types of MNHN), we consider unlikely that the collection data label of this male has been wrongly transcribed. If this is the specimen described by Fage, it was either posteriorly mislabeled or Fage forgot to list Narmoroka in his description. It is probable that the labels that indicate that these specimens are “types” have been incorporated by Roland Legendre in the decade of the 1970s, since they have similar typography as those in the vials containing the types of *A. milloti* and *A. monodi*, described by him. The caves to which both labels refer are closely located, and we consider the male of Narmoroka cave as conspecific with the specimens from Andoharano cave (here designated as female lectotype and juvenile paralectotypes), but the type status of the male should be viewed with caution.

Diagnosis. Males of *A. decaryi* are very similar to those of *A. simoni* by the sinuous embolus, curved ventro-retrolaterally, but differ by the relatively elongated bulb (Fig. 13). Female genitalia are also similar to those of *A. simoni* but differ by having the

outer spermathecae wider and slightly more globose (Fig. 14). Both sexes are paler and slightly longer legged than *A. simoni* (Fig. 12) (femur I/carapace length: male 2.34, female 1.67).

Description. Male (putative syntype) from Grotte de Narmoroka, Madagascar (MNHN AR 5466). Coloration yellowish cream except where noted. Carapace with brown V-shaped pattern posterior to the eyes, continuing posteriorly in a symmetric pattern, reaching the posterior margin, the margins lighter. Chelicerae light orange. Labium slightly darker than sternum. Endites and sternum cream. Legs uniformly yellowish cream. Abdomen dorsum with faint grey chevron restricted to the median area, composed by five markings; venter uniformly cream. Anterior margin of the carapace slightly truncate. Sternum subrounded, sigilla not visible. Total length 4.76. Carapace length 2.14, width 1.80. Clypeus length 0.50. Eye diameters: AME (anterior median eye) 0.10; PME (posterior median eye) 0.10; ALE (anterior lateral eye) 0.16; PLE (posterior lateral eye) 0.16. Sternum length 1.20, width 1.14. Palp: femur length 1.12, height 0.24; tibia length 1.04, height 0.36. Leg I: femur 5.01. II: fe

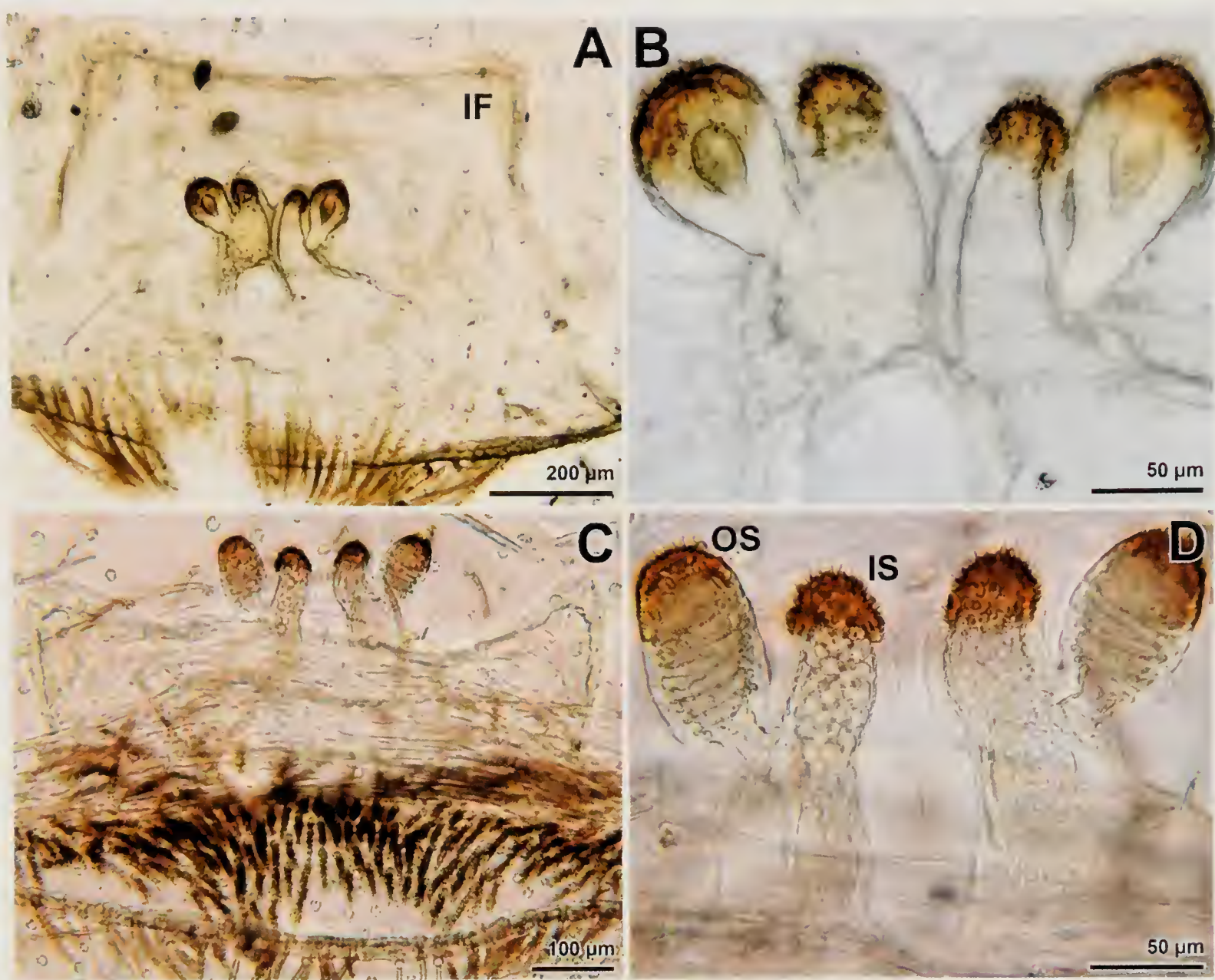


Figure 14. *Andoharano decaryi* (Fage, 1945), female spermathecae, dorsal view. A, B. Lectotype (MNHN AR 5467). C, D. Female from the type locality (MRAC 133618). Abbreviations: IF = interpulmonary fold, IS = inner spermathecae, OS = outer spermathecae.

(femur) 3.6; pa (patella) 0.76; ti (tibia) 3.6; me (metatarsus) 3.04; ta (tarsus) 1.28. III: fe 3. IV: fe 3.4. Abdomen: length 2.64, width 1.44. Metatarsus II with strong retrolateral condyle. Leg macrosetae: tibiae I, 1 medial-prolateral, 1 ma.p. Palp: cymbium convex, small, ventrally reduced, with a retrolateral forelock of setae; bulb piriform, subconical; sperm duct with two coils, the distal one forming a retrolateral bend; paraembolic lamina absent; embolus sinuous, curved ventro-retrolaterally; tibia long, widest distally, with 4–5 strong apical setae in ventral face. State of the specimen: left palp missing, right palp dissected from tibia,

both legs I disarticulated from tibiae, general aspect decolored.

Female lectotype from Grotte d'Andoharano, Madagascar (MNHN AR 5467). Coloration as in male, but slightly darker. Carapace as in male, but less contrasting dorsal brown pattern. Anterior margin of the carapace unmodified. Sternum sub-rounded, sigilla not visible. Total length 6.7. Carapace length 2.2, width 2.04. Clypeus length 0.32. Eye diameters: AME 0.08; PME 0.08; ALE 0.18; PLE 0.16. Sternum length 1.22, width 1.22. Palp: femur length 1.64, height 0.42; tibia length 1.2, height 0.32. Leg I: femur 3.68. II: fe 2.68. III: fe 2.28. IV: fe 2.84. Abdomen:

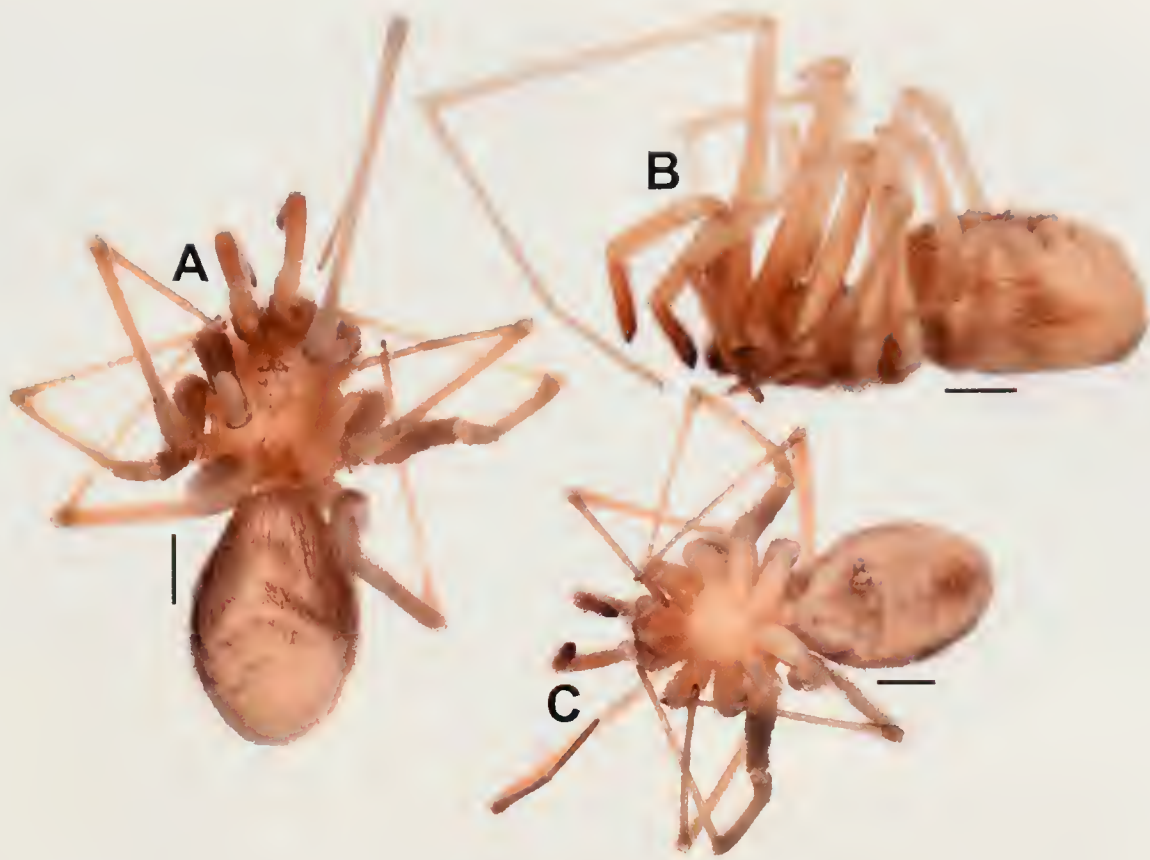


Figure 15. *Andoharano monodi* Legendre, 1971, female holotype (MNHN), habitus. A. Dorsal. B. Lateral. C. Ventral. Scale bars = 1 mm.

length 4.2, width 3.72. Leg macrosetae absent. Calamistrum with three rows with 12-13-6 (inner to outer row). Interpulmonary fold sub-squarish, with straight anterior margin; spermathecae with free membranous bases; inner spermathecae digitiform, tapering toward apex, slightly sinuous, with glandular pores restricted to the apical portion; outer spermathecae long, suboval, with a wide stalk, with pores restricted to apical portion. State of the specimen: good, but seems to have been collected during the molting process: the setae of the underlying cuticle are visible, especially in the legs, where they are aligned, making the legs appear to have longitudinal darker bands; genitalia dissected.

Variation. Females ($N = 4$): total length [range (mean)] 5.1–6.9 (6.23), carapace length 2.12–2.45 (2.27), femur I length 3.48–4.02 (3.73), femur/carapace ratio 1.62–1.67 (1.64).

Distribution and Natural History. Known only from two nearby caves in Toliara, Madagascar (Fig. 1).

Other Material Examined. **MADAGASCAR. Toliara:** SW of the island, Valley Manombo, Andoharano cave [22.83333°S, 43.66667°E], F. Rossi, 1965, 3 ♀ (MRAC 133618).

Andoharano monodi Legendre, 1971
Figures 1, 15–16

Andoharano monodi Legendre, 1971: 648, figs. 2, 3.

Holotype. **MADAGASCAR. Région de Morombé:** Au S. d'Ampalonga, Grotte du guano = Asafura, rec. I4911 [21.74889°S, 43.36306°E], Th. Monod, 11/X/1970, 1 ♀ (MNHN Fil. 5). Literal label: Grotte du guano=Asafura | AuS. D'Ampalonga région | de Morombé (Madagascar) | Th Monod rec.n° I4911 | (11 X 1970)/(in a second label) *Andoharano monodi* | R. Legendre 1971 det. | TYPE.

Remarks. The holotype is the only known specimen.

Diagnosis. The only known female resembles that of *A. decaryi* by the general body morphology and internal genitalia, but

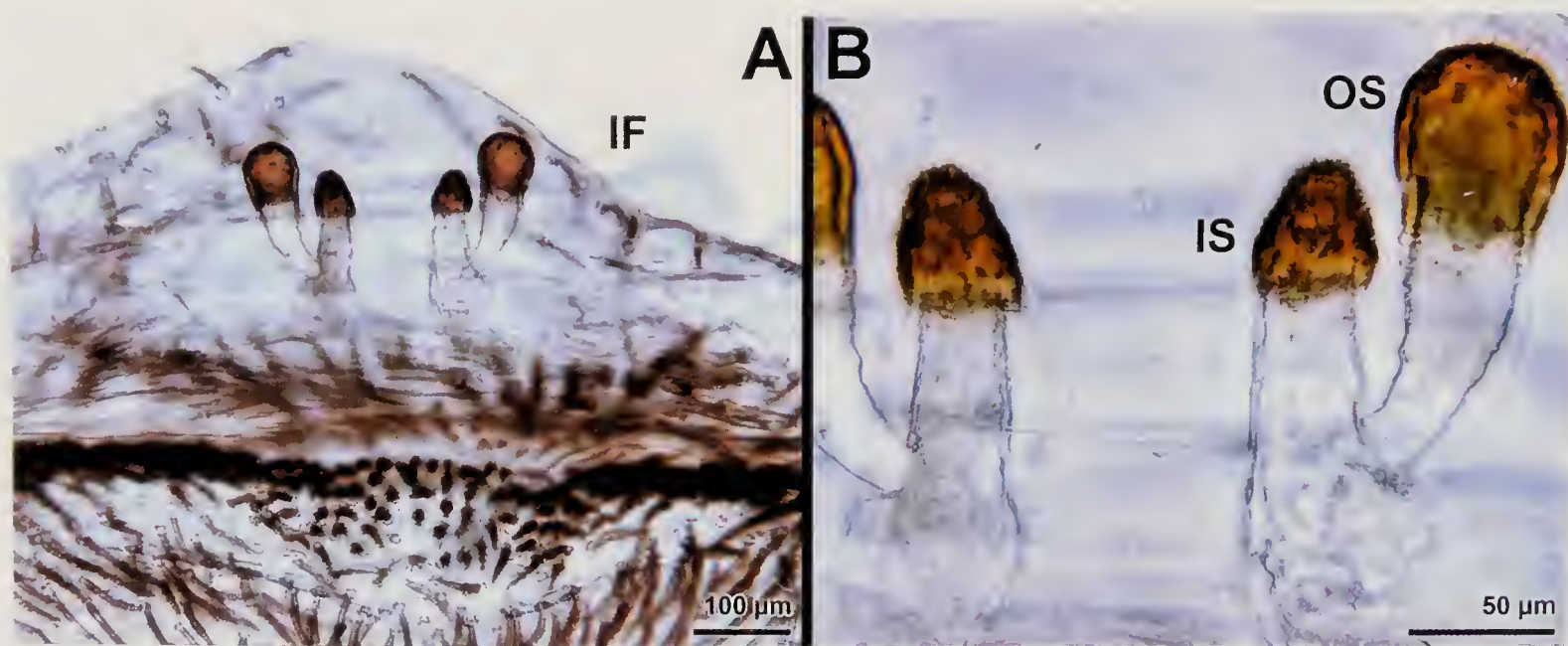


Figure 16. *Andoharano monodi* Legendre, 1971, female holotype (MNHN), spermathecae, dorsal view. Abbreviations: IF = interpulmonary fold, IS = inner spermathecae, OS = outer spermathecae.

the outer spermathecae largely surpass the inner ones in length and have larger pore-bearing areas (Fig. 16).

Description. Female holotype from Grotte du Guano = Asafura Au S. d'Ampalonga, Morombé, Madagascar (MNHN AR, voucher CJG-1732). Coloration yellowish cream except where noted. Carapace with a very diffuse brown V-shaped pattern posterior to the eyes, continuing posteriorly in a symmetric pattern, reaching the posterior margin, with many setae on the median area. Chelicerae, labium and endites light orange. Sternum yellowish cream. Legs uniformly yellowish cream. Abdomen dorsum uniformly cream; venter uniformly cream. Anterior margin of the carapace unmodified. Sternum subrounded, sigilla not visible. Total length 6.06. Carapace length 2.36, width 2.04. Clypeus length 0.6. Eye diameters: AME 0.1; PME 0.1; ALE 0.18; PLE 0.16. Sternum length 1.2, width 1.24. Palp: femur length 1.7, height 0.42; tibia length 1.22, height 0.32. Leg I: femur 4.04. II: fe 2.88. III: fe 2.6. IV: fe 2.88. Abdomen: length 3.56, width 2.48. Leg macrosetae absent. Calamistrum damaged, apparently the outer row has 11 setae. Interpulmonary fold sub-squarish, with straight anterior margin; spermathecae with

free membranous bases; inner spermathecae digitiform, not sinuous, with glandular pores restricted to a subtriangular area in the apical portion; outer spermathecae suboval, elongate, with a wide stalk, with pores restricted to a large area in the apical portion. State of the specimen: relatively good, but apparently decolored; genitalia dissected and kept in a microvial.

Distribution and Natural History. Known only from the Asafura cave in Toliara, Madagascar (Fig. 1).

Other Material Examined. None.

Andoharano simoni sp. nov.

Figures 1–3, 5–6, 8A, 10, 17–20

Holotype. MADAGASCAR. **Toliara:** Mahafaly, Eloetse, by Lac Tsimanampetsotsa (24.16667°S, 43.75°E), V. Roth & B. Roth, 15–16/IX/1992, 1 ♂ in the same vial as 3 ♀ paratypes (CAS 9014032).

Paratypes. MADAGASCAR. **Toliara:** same data as the holotype, 3 ♀ (CAS 9014033), 3 ♀ (MCZ 54669); *Parc National de Tsimanampetsotsa*, in a cave of bats [24.11°S, 43.84°E], J. Beccaloni, 26/XI/2004, 5 ♀ (CAS 9062890).

Etymology. The specific epithet is a patronymic in honor of the eminent French

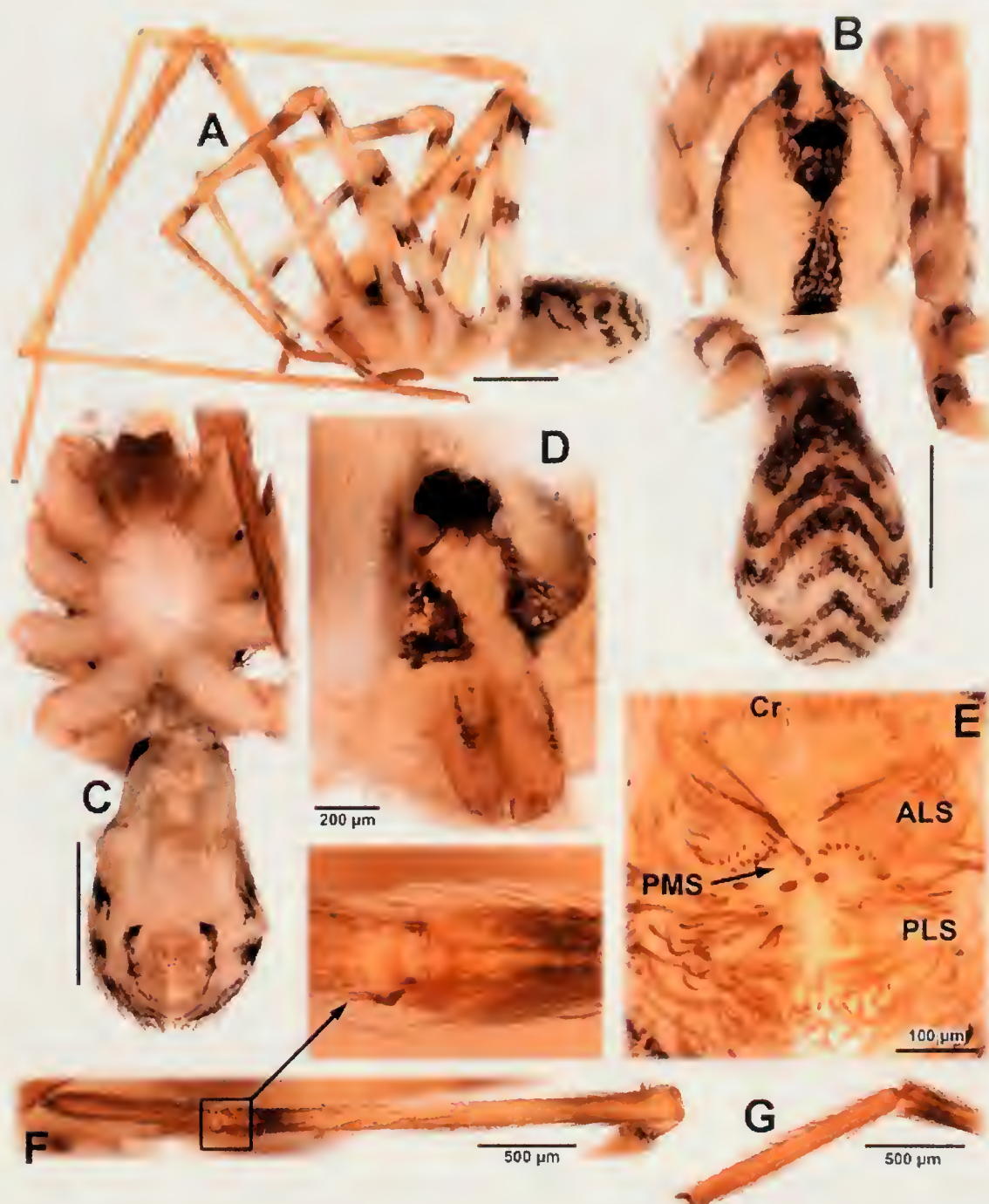


Figure 17. *Andoharano simoni* sp. nov., male holotype (CAS 9014032), habitus. A. Lateral. B. Dorsal. C. Ventral. D. Clypeus, subanterior. E. Spinnerets, ventral. F. Left metatarsus II, dorsal. G. Left tarsus II, retrolateral. Scale bars = 1 mm, except where noted. Abbreviations: Cr = cribellum, ALS = anterior lateral spinnerets, PLS = posterior lateral spinnerets, PMS = posterior median spinnerets.

arachnologist Eugène Simon (1848–1924), who was the first to describe a species assigned currently to this genus (*F. grandidieri*).

Diagnosis. Males of *A. simoni* are very similar to those of *A. decaryi* by the sinuous embolus, curved ventro-retrolaterally, but differ by the relatively shortened bulb (Fig. 19). Female genitalia are also similar to those of *A. simoni* but differ by having more slender outer spermathecae (Fig. 20). Both sexes have a more contrasting color pattern and are slightly short-legged compared with

A. decaryi (Figs. 17, 18) (femur I/carapace length: male 2.18, female 1.55).

Description. Male holotype from Lac Tsimanampetsotsa, near Eloetse, Toliara, Madagascar (CAS 9014032). Carapace lined with brown, with brown pattern extending from the eyes to the posterior border of the carapace, submarginal bands absent. Chelicerae with anterior brown patch. Labium orange. Sternum whitish cream. Legs with brown, open rings: three on femora, two on tibiae, and a distal one in metatarsi; all rings better defined in legs III and IV. Abdomen

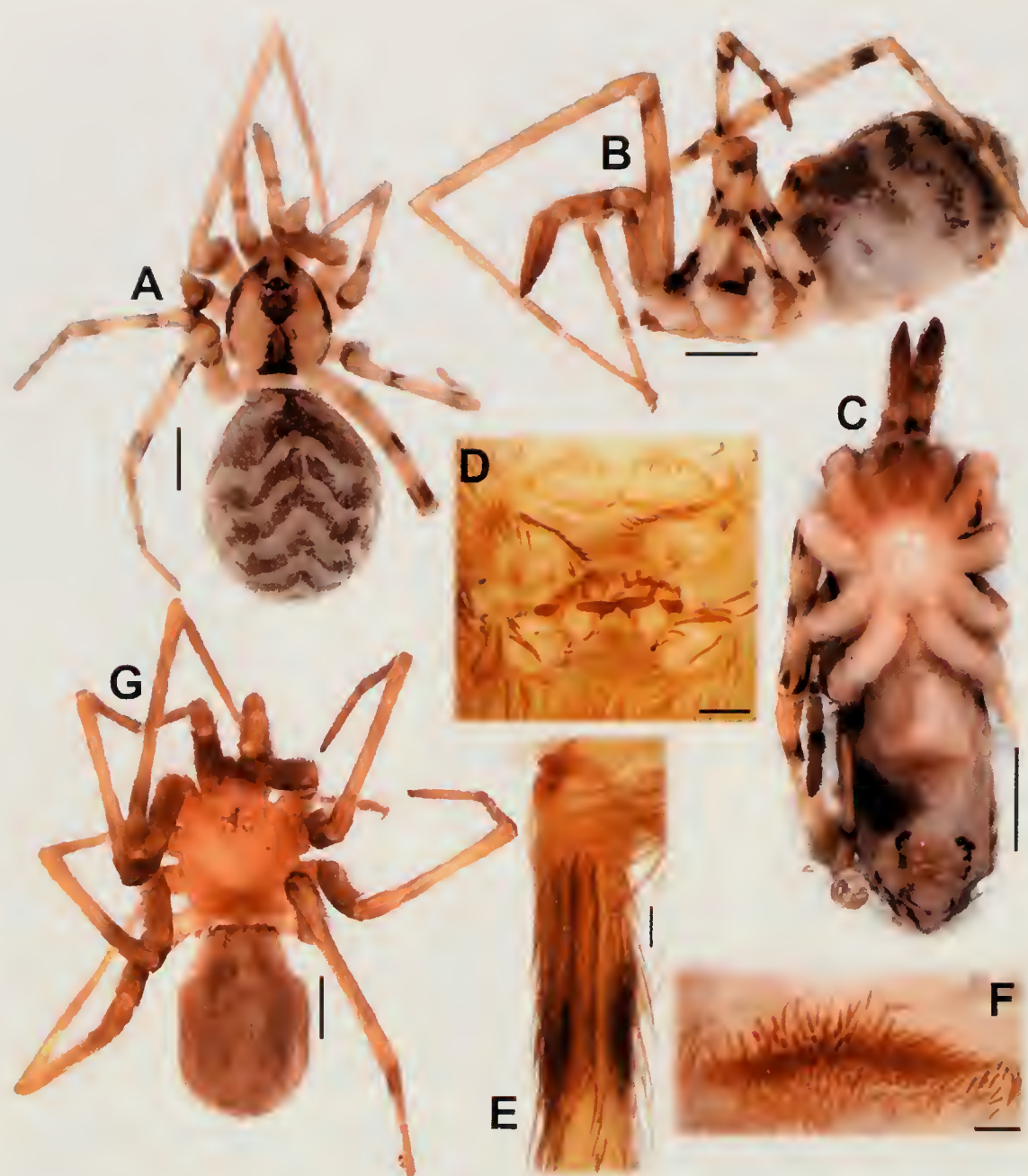


Figure 18. *Andoharano simoni* sp. nov., females. A–F. Paratype (CAS 9014032). A. Habitus, dorsal. B. Same, lateral. C. Same, ventral. D. Spinnerets, ventral. E. Left calamistrum, retrolateral. F. Genital area, ventral. G. Female from Toliara, Tsimanampetsotsa National Park (CAS 9062890), habitus, dorsal. Scale bars = 1 mm (A–C, G) or 0.1 mm (D–F).

dorsum with seven brown chevron markings; venter cream, with two bands siding the spinnerets. Anterior margin of the carapace slightly truncate. Sternum subrounded, sigilla not visible. Total length 3.68. Carapace length 1.63, width 1.33. Clypeus length 0.37. Eye diameters: AME 0.097; PME 0.1; ALE 0.142; PLE 0.123. Sternum length 1.01; width 0.87. Palp: femur length 1.14, height 0.23; tibia length 0.72, height 0.25. Leg I: femur 3.56. II: fe 2.63; pa 0.56; ti 2.58; mt 2.27; ta 1.13. III: fe 2.01. IV: fe 2.64. Abdomen: length 2.04, width 1.15. Metatarsus II with strong retrolateral condyle. Leg macrosetae: tibiae I, 1

m.p, 1 ma.p. Palp: cymbium convex, small, ventrally reduced, with a retrolateral forelock of setae; bulb piriform, subconical; sperm duct with two coils, the distal one forming a retrolateral bend; fundus ventrally pointed; paraembolic lamina absent; embolus sinuous, curved ventro-retrolaterally; tibia long, widest distally, with 4–5 strong apical setae in ventral face. State of the specimen: abdomen disarticulated from cephalothorax, legs III and IV missing from tibia, both palps dissected, left embolus broken.

Female paratype from Lac Tsimanampetsotsa, near Eloetse, Toliara, Madagascar

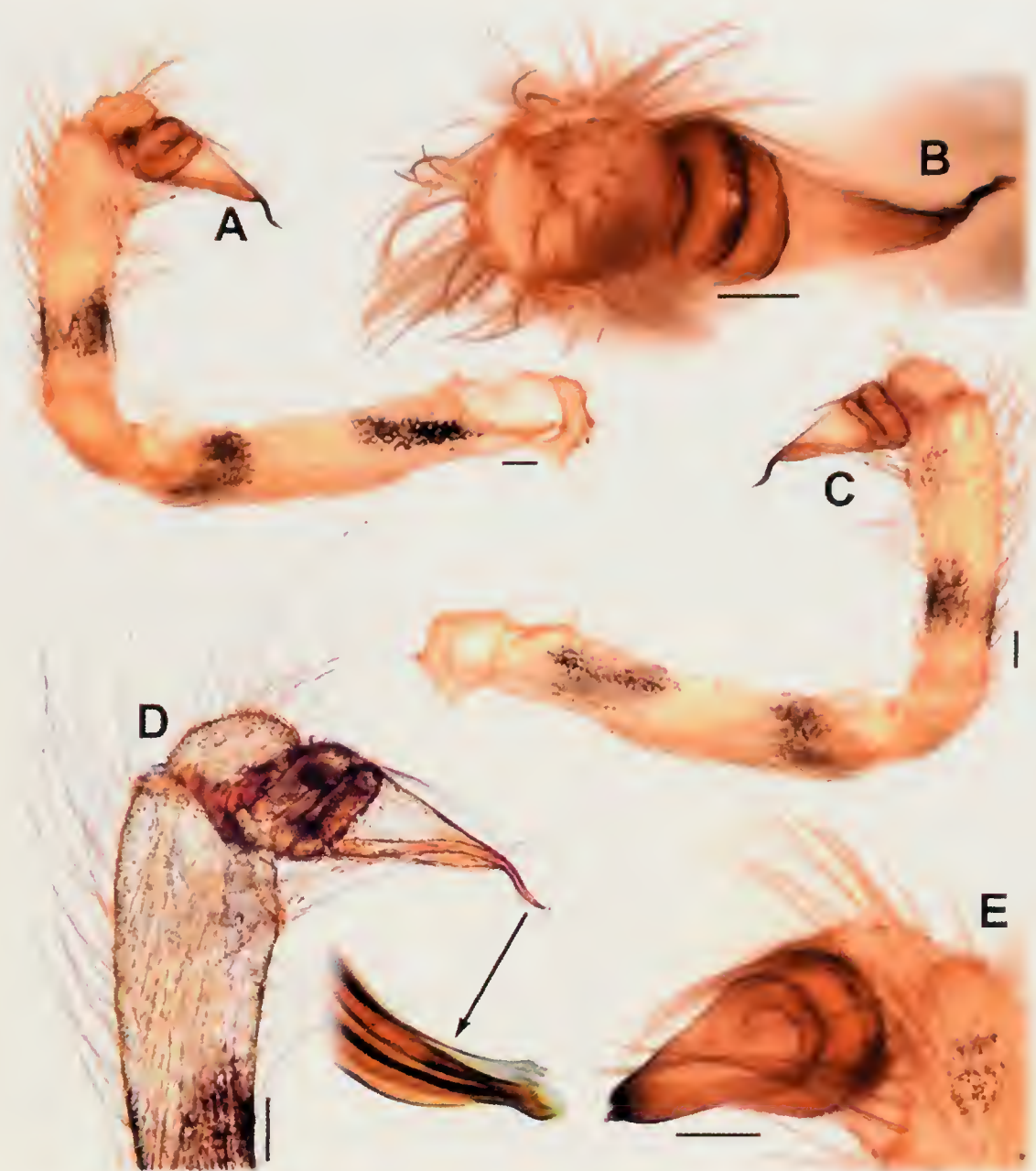


Figure 19. *Andoharano simoni* sp. nov., male holotype (CAS 9014032), right palp, mirrored. A. Prolateral. B. Dorsal. C. Retrolateral. D. Prolateral, clove oil cleared. Inset showing detail of embolus tip. E. Subventral. Scale bars = 0.1 mm.

(CAS 9014032). Coloration as in male. Anterior margin of the carapace unmodified. Sternum subrounded, sigilla not visible. Total length 5.35. Carapace length 1.92, width 1.68. Clypeus length 0.47. Eye diameters: AME 0.091; PME 0.12; ALE 0.167; PLE 0.126. Sternum length 0.9, width 0.9. Palp: femur length 1.39, height 0.33; tibia length 0.9, height 0.24. Leg I: femur 2.98. II: fe 2.19; pa 0.53; ti 2.14; mt 1.81; ta 1.07. III: fe 1.85. IV: fe 2.4. Abdomen: length 3.24, width 2.74. Leg macrosetae absent. Calamistrum with three rows with 15–17 setae. Interpulmonary fold

sub-squarish, with straight anterior margin; spermathecae with free membranous bases; inner spermathecae digitiform, tapering toward apex, slightly sinuous, with glandular pores restricted to the apical portion; outer spermathecae suboval, with an annulated stalk, with pores restricted to apical portion. State of the specimen: good, but left leg II and right leg IV missing from tibia; genitalia dissected and kept in a microvial.

Variation. Females ($N = 3$): total length 5.14–6.43 (5.64), carapace length 1.92–2.44 (2.21), femur I length 2.98–3.77 (3.45), femur/carapace ratio 1.55–1.59 (1.56). One

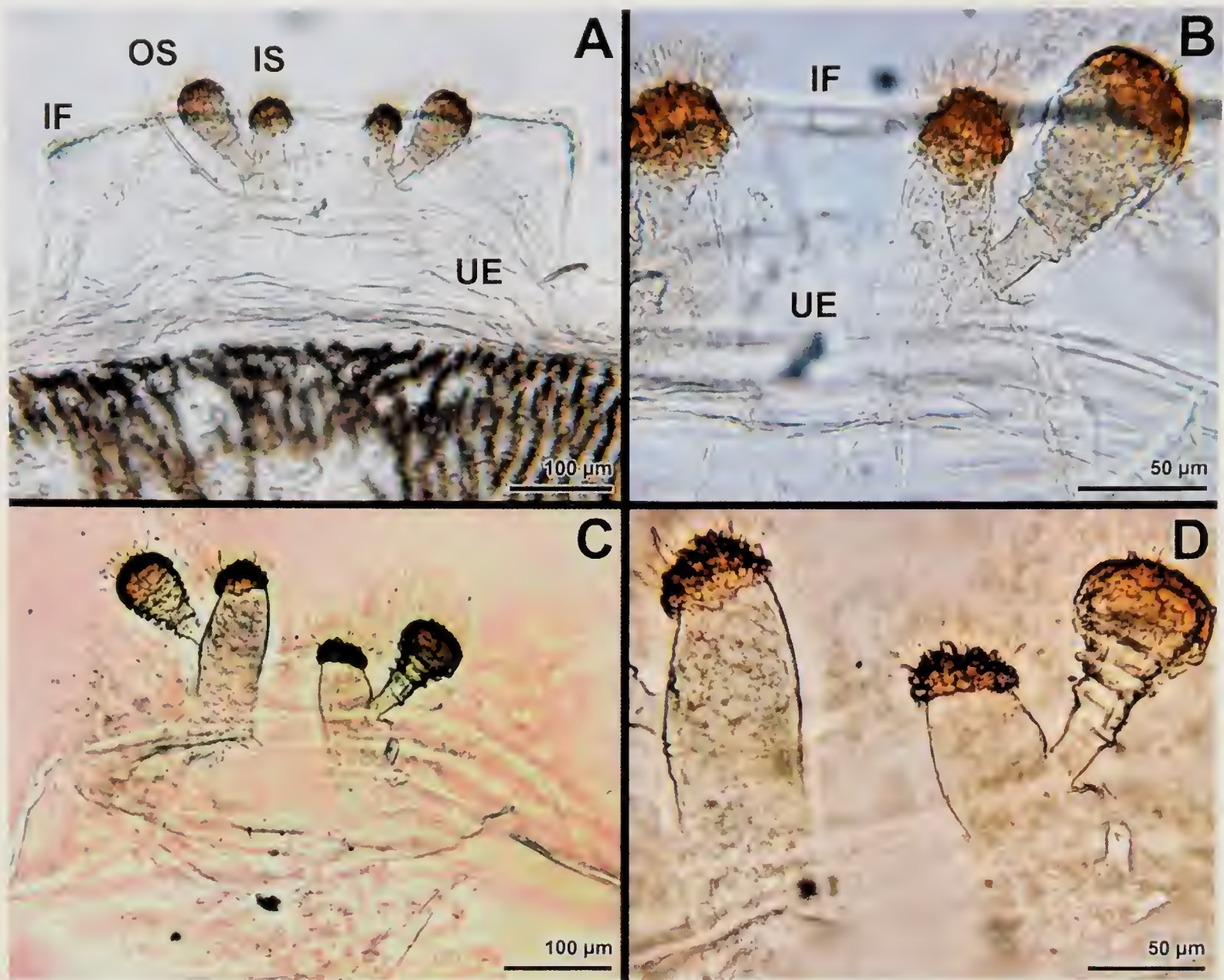


Figure 20. *Andoharano simoni* sp. nov., females, spermathecae, dorsal view. A, B. Paratype (MCZ 54669). C, D. Female from Toliara, Tsimanampetsotsa National Park (CAS 9062890). Abbreviations: IF = interpulmonary fold, IS = inner spermathecae, OS = outer spermathecae, UE = uterus externus.

of the females lacks the contrasting coloration of typical specimens (Fig. 18G), but its genitalia does not differ significantly from other specimens (Fig. 20).

Distribution and Natural History. Known only from Parc National de Tsimanampetsotsa, Toliara, Madagascar (Fig. 1).

Other Material Examined. None.

Andoharano zonsteini sp. nov.
Figures 9, 21–22

Holotype. **MADAGASCAR. Toliara:** *Parc National de Tsimanampetsotsa*, Forêt de Bemanateza, spiny forest/thicket, pitfall traps (23.99222°S, 43.88056°E, elevation

90 m), B. L. Fisher et al., 22–26/III/2002, 1 ♂, in the same vial as 1 ♂ paratype (CAS 9014583).

Remarks. A small female from Parc National de Tsimanampetsotsa (CAS 9000423) might be conspecific with the males here described as *A. zonsteini*. The shape of its receptacles (see Fig. 43D) resembles that of *A. simoni*, and we initially thought it belonged to this species, but it is much smaller in size and the outer spermathecae are more globose, suggesting it might belong to another species, and *A. zonsteini*, whose female is unknown, occurs in close geographic proximity. However, currently we cannot dismiss the possibility that it is a

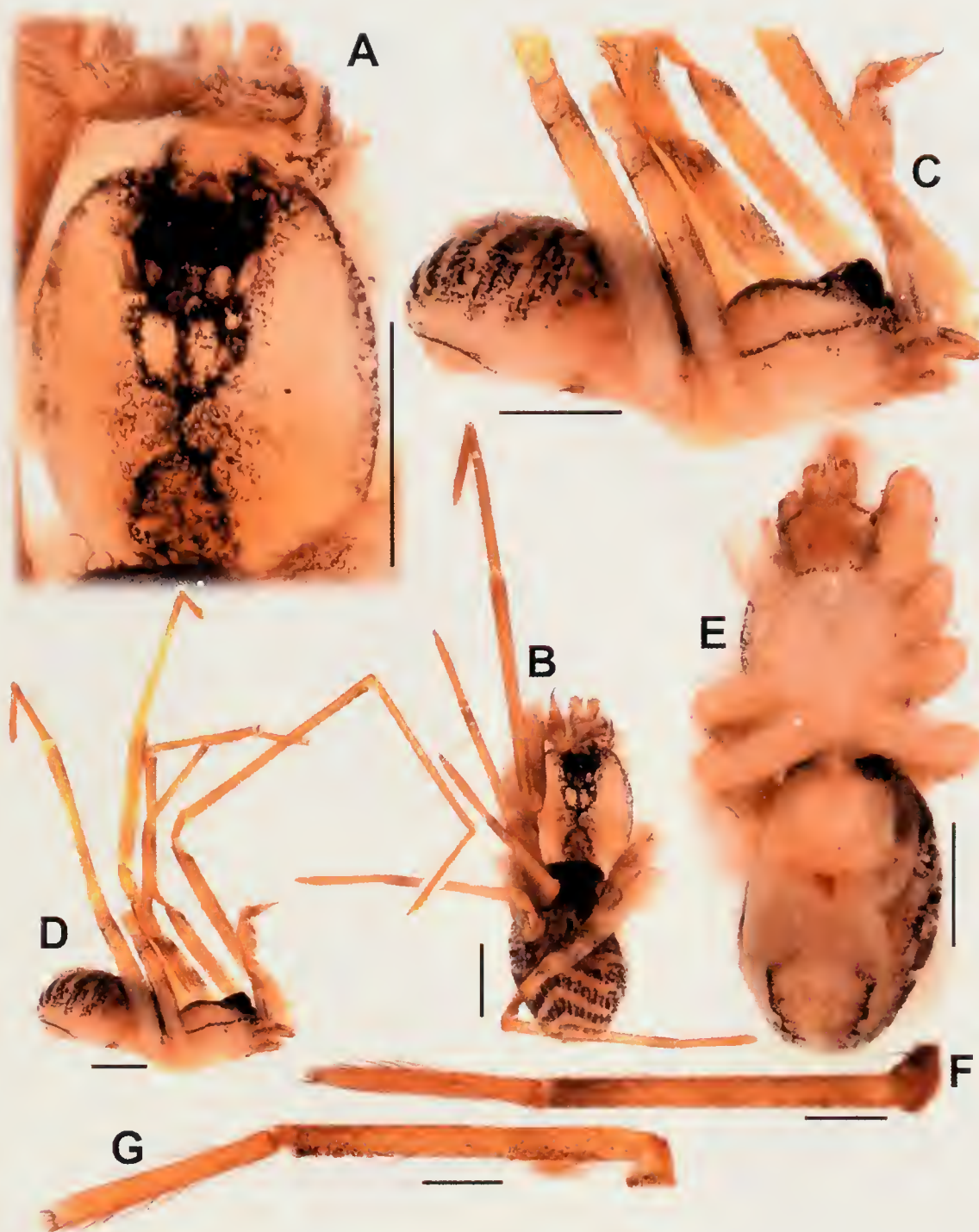


Figure 21. *Andoharano zonsteini* sp. nov., male paratype (CAS 9014583), habitus. A. Carapace, dorsal. B. Dorsal. C, D. Lateral. E. Ventral. F, G. Left leg II: F. Dorsal. G. Retrolateral. Scale bars = 0.5 mm, except for F, G, scale bars = 0.1 mm.

subadult female of *A. simoni*. Furthermore, this female has not been collected in the exact same site as the males of *A. zonsteini*. Thus, we illustrate its genitalia (Fig. 43D) but list it along with other undetermined female specimens of *Andoharano* in the end of the taxonomic section.

Etymology. The specific epithet is a patronymic in honor of the arachnologist Sergei Zonstein in recognition of his contributions to our knowledge of the family Filistatidae, especially on the Old World fauna.

Diagnosis. The male are easily distinguished by the embolus, hook-shaped and curved dorso-retrolaterally (Figs. 9, 22).

Description. Male holotype from Forêt de Bemanateza, Toliara, Madagascar (CAS 9014583). Coloration yellowish cream, except where noted. Carapace lined with brown, with brown pattern extending from the eyes to the posterior border of the carapace. Chelicerae with anterior brown patch. Sternum cream, with some brown stipples anteriorly. Legs with faint, light brown, open rings: three on femora, two on

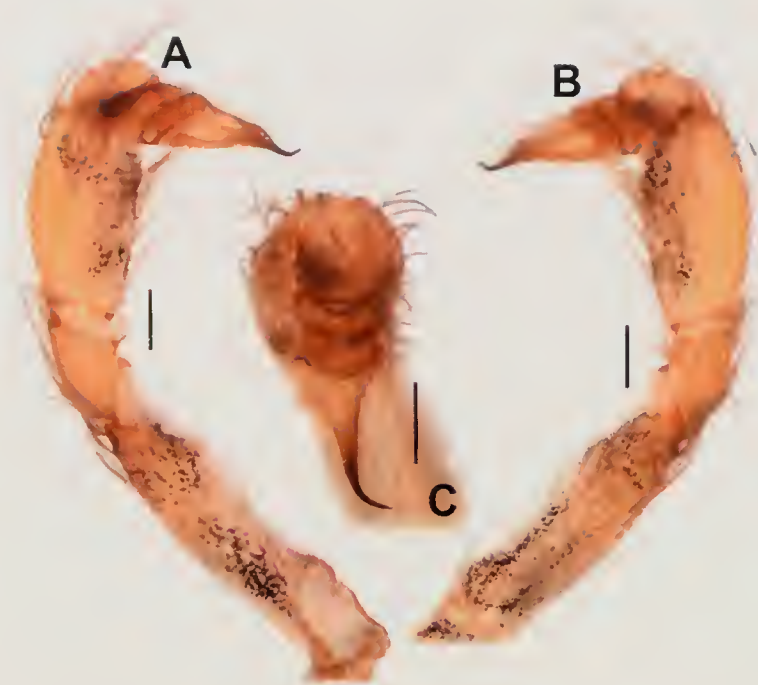


Figure 22. *Andoharano zonsteini* sp. nov., male paratype (CAS 9014583), left palp. A. Prolateral. B. Retrolateral. C. Bulb, dorsal. Scale bars = 0.1 mm.

tibiae, and a distal one on the metatarsi. Abdomen dorsum with five dark brown chevron markings; venter cream, with two bands siding the spinnerets. Anterior margin of the carapace slightly truncate. Sternum subrounded, sigilla not visible. Total length 2.02. Carapace length 0.91, width 0.71. Clypeus length 0.15. Eye diameters: AME 0.08; PME 0.06; ALE 0.1; PLE 0.1. Sternum length 0.58, width 0.52. Palp: femur length 0.53, height 0.13; tibia length 0.33, height 0.17. Leg I: femur 1.84. II: fe 1.22; pa 0.29; ti 1.24; mt 0.92; ta 0.55. III: fe 1.04. IV: fe 1.44. Abdomen: length 1.11, width 0.74. Metatarsus II with strong retrolateral condyle. Leg macrosetae absent. Palp: cymbium convex, small, ventrally reduced, with a retrolateral forelock of setae; bulb piriform, subconical; sperm duct with two coils, the distal one forming a retrolateral bend; fundus ventrally pointed; prolateral excavation absent; paraembolic lamina absent; embolus hook-shaped, curved dorso-retrolaterally. State of the specimen: good, left palp dissected, most setae missing, right legs I and II missing.

Female unknown (but see Remarks above).

Variation. Males ($N = 2$): total length 1.61–2.02 (1.82), carapace length 0.83–0.91 (0.87), femur I length 1.84–1.85 (1.85), tibia I length 2.08–2.17 (2.13), femur/carapace ratio 2.02–2.23 (2.13).

Distribution and Natural History. Specimens have been collected in pitfall traps in spiny forest from Parc National de Tsimanampetsotsa, Toliara, Madagascar (Fig. 1).

Other Material Examined. None.

Andoharano grandidieri (Simon, 1901)

Figures 1, 23–25

Filistata grandidieri Simon, 1901: 67.

Andoharano grandidieri: Lehtinen, 1967: 214, fig. 24; Legendre, 1971, fig. 5; Zonstein and Marusik, 2015: 486, fig. 13.

Lectotype (here designated). **MADAGASCAR. Toliara** intér. Grotte de Sarandrano [23.5395°S, 43.77423°E], G. Grandidier, 19/V/1898, 1 ♂ (MNHN AR5472).

Paralectotypes (here designated). **MADAGASCAR. Toliara:** intér. Grotte de Sarandrano [23.5395°S, 43.77423°E], G. Grandidier, 19/V/1898, 3 ♀ (MNHN AR5472). Literal label: MUSEUM PARIS AR 5472 | *Filistata grandidieri* E.S. | **TYPES** - Madagascar -: intér. grotte de Sarandrano | G. Grandidier (19-5-1898) | Bull. Du Museum, février 1901. **No data:** 1 ♂ (MNHN AR5473/20468). Literal label: MUSEUM PARIS AR 5473 | *Andoharano grandidieri* E.S., 1901 | Types.

Remarks. In the collection of MNHN, two vials are labeled “types.” These labels are not the originals: one vial (AR 5472) was relabeled with the complete collection data and contains one male and three females; the other vial (AR 5473) has a single male, but the label only mentions the specific identification, without date or locality, although it includes a small label with the number 20468. Both males are undoubtedly conspecific. In the original description, Simon did not mention the number of specimens studied, and we suspect that the male AR 5473 could have been sepa-

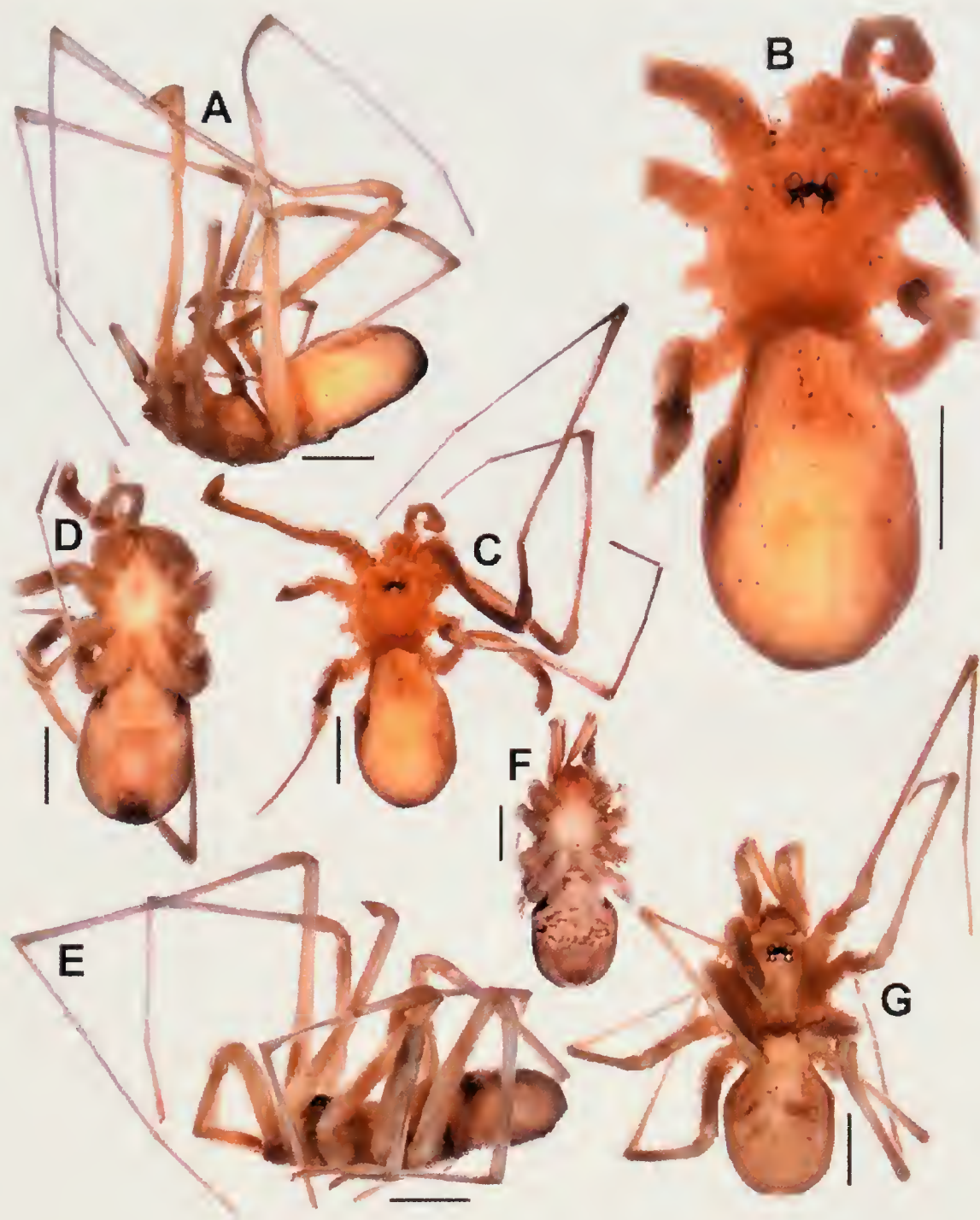


Figure 23. *Andoharano grandidieri* (Simon, 1901), habitus. A–D. Male paralectotype (MNHN AR 5473). A. Lateral. B, C. Dorsal. D. Ventral. E–G. Female paralectotype (MNHN AR 5472). E. Lateral. F. Ventral. G. Dorsal. Scale bars = 1 mm.

rated from the original vial (maybe by Lehtinen, when he illustrated this species in 1967?). By virtue of having the complete data in the label, we opted for designating the male in the vial AR 5472 as a lectotype. Simon (1901) placed this locality on the east coast of the island (“eôte orientale de Madagascar”), but more recent revisions place Sarandrano eave on the west coast (Remillet 1973); we have followed the latter for drawing the map.

Diagnosis. *Andoharano grandidieri* males resemble those of *A. lehtineni* by the nearly

trapezoidal bulb in lateral view, with a dorsally convex outline, but the femur and tibia are relatively longer (Fig. 24) (palpal tibia length/height: 2.92). Females differ by the subtriangular inner spermathecae, which surpass the globose outer spermathecae in length (Fig. 25).

Description. Male paralectotype (MNHN AR 5473). Coloration cream. Carapace uniform (probably faded). Chelieerae yellowish cream. Labium, endites and sternum cream. Legs uniformly cream. Abdomen dorsum uniformly cream; venter uniformly

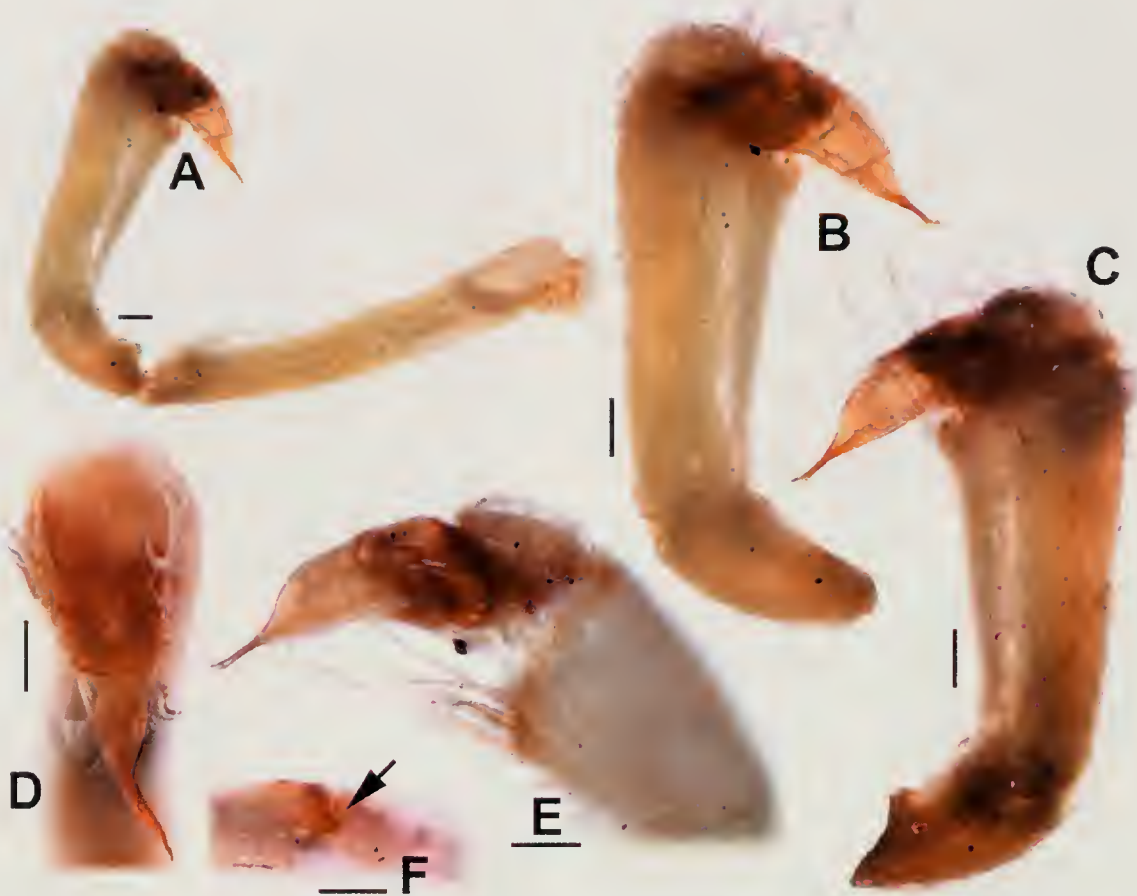


Figure 24. *Andoharano grandidieri* (Simon, 1901). A–E. Male genitalia. A–D. Male paralectotype (MNHN AR 5473), left palp. A, B. Prolateral. C. Retrolateral. D. Dorsal. E. Male lectotype (MNHN AR 5472), right bulb, retrolateral, mirrored. F. Male paralectotype (MNHN AR 5473), right metatarsus II, apex. Arrow points to retrolateral condyle. Scale bars = 0.1 mm.

cream. Anterior margin of the carapace unmodified. Sternum subrounded, sigilla not visible. Total length 4.04. Carapace length 1.62, width 1.34. Clypeus length 0.36. Eye diameters: AME 0.08; PME 0.1; ALE 0.16; PLE 0.12. Sternum length 0.82, width 0.76. Palp: femur length 1.06, height 0.18; tibia length 0.7, height 0.24. Leg I: femur 3.96. II: fe 2.88; pa 0.58; ti 2.8; mt 2.36; ta 1.04. III: fe 2.24. IV: fe 3. Abdomen: length 2.4, width 1.64. Metatarsus II with strong retrolateral condyle. Leg macrosetae: tibiae I, 1 mb.r, 2 m.r, 2 ma.r, 1 m.p, 2 ma.p. Palp: cymbium convex, small, ventrally reduced, with a retrolateral forelock of setae; bulb piriform, trapezoidal; sperm duct with two coils, the distal one forming a retrolateral bend; paraembolic lamina absent; embolus almost straight, short, curved retrolaterally; tibia long, widest distally, with several strong apical setae in ventral face. State of the specimen: poor;

lacking many leg articles and faded; left palp dissected and kept in a microvial.

Female paralectotype from Grotte de Sarandrano, Madagascar (MNHN AR 5472). Coloration as in male. Anterior margin of the carapace unmodified. Sternum subrounded, sigilla not visible. Total length 3.96. Carapace length 1.56, width 1.3. Clypeus length 0.5. Eye diameters: AME 0.08; PME 0.08; ALE 0.16; PLE 0.14. Sternum length 1, width 0.94. Palp: femur length 1.24, height 0.28; tibia length 0.98, height 0.24. Leg I: femur 3.2. II: fe 2.44. III: fe 2. IV: fe 2.6. Abdomen: length 2.3, width 1.54. Leg macrosetae absent. Calamistrum with three rows with 11-12-6 (inner to outer row). Interpulmonary fold sub-squarish, with straight anterior margin; spermathecae with free membranous bases; inner spermathecae short, subtriangular, with glandular pores restricted to the apical portion; outer spermathecae globose, laterally directed, with pores restricted to apical

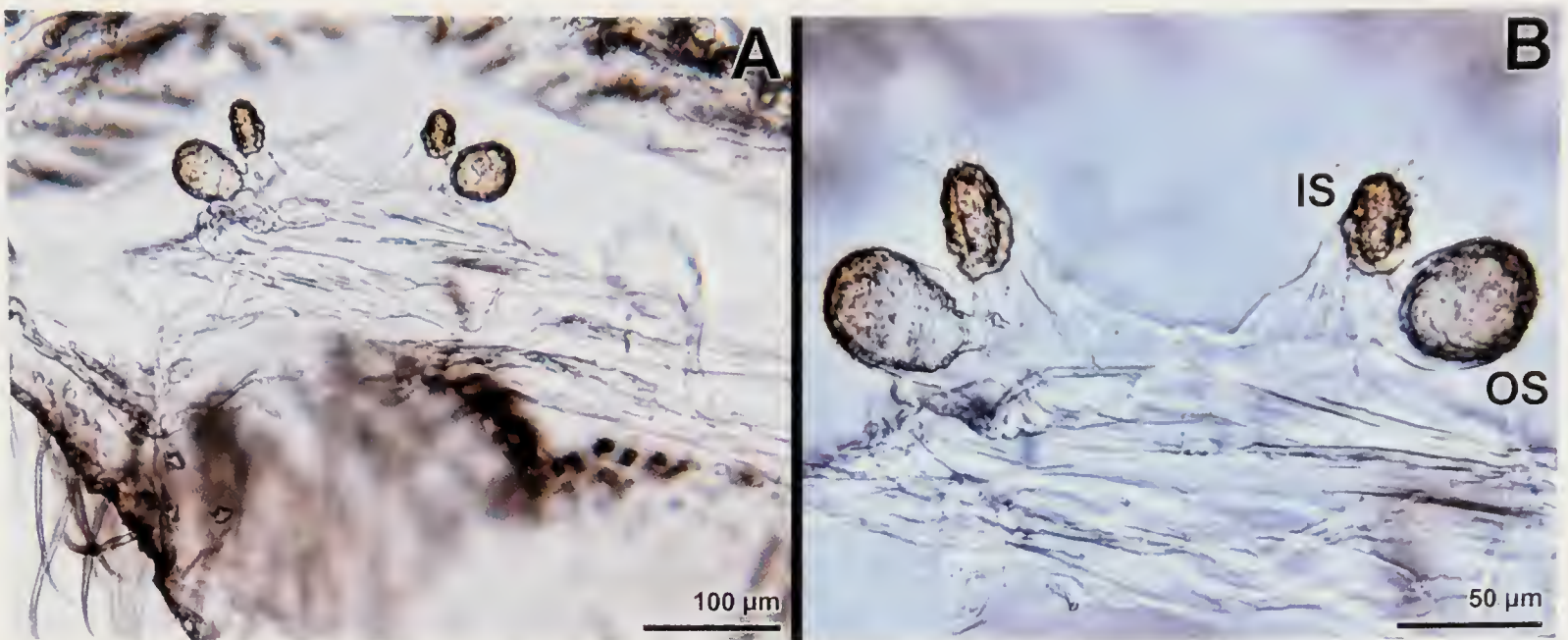


Figure 25. *Andoharano grandidieri* (Simon, 1901), female paralectotype (MNHN AR 5472), spermathecae, dorsal view. Abbreviations: IS = inner spermathecae, OS = outer spermathecae.

portion. State of the specimen: poor; lacking many leg articles and faded; genitalia dissected and kept in a microvial.

Variation. Males ($N = 2$): total length 3.26–4.04 (3.65), carapace length 1.56–1.62 (1.59), femur I length 3.9–3.96 (3.93), femur/carapace ratio 2.44–2.5 (2.47). Females ($N = 3$): total length 2.96–3.96 (3.51), carapace length 1.35–1.56 (1.47), femur I length 2.62–3.2 (2.95), femur/carapace ratio 1.94–2.05 (2). The lectotype male has three and two macrosetae on the first tibia retro-lateral and prolateral faces, respectively.

Distribution and Natural History. Known only from Sarandrano cave in Toliara, Madagascar (Fig. 1).

Other Material Examined. None.

Andoharano lehtineni sp. nov.
Figures 1, 8C, 26–28

Holotype. MADAGASCAR. **Toliara:** Réserve Spéciale de Cap Sainte Marie, 15 km W Marovato, spiny forest/thicket, pitfall trap (25.59444°S, 45.14694°E, 160 m), B. L. Fisher et al., 13–19/II/2002, 1 ♂ (CAS 9014164).

Paratypes. Same data as the holotype, 12.3 km W Marovato, spiny forest/thicket, litter sifting (25.58167°S, 45.16833°E, 160

m), B. L. Fisher et al., 11–15/II/2002, 2 ♀ 1 imm. (CAS 9004899).

Etymology. The specific epithet is a patronymic in honor of the Finnish arachnologist Pekka Lehtinen, author of the genus, in recognition of his contributions to modern arachnology and to the genus-level taxonomy of filistatids.

Diagnosis. Both sexes can be distinguished from other species by having brown patches near the book lung openings (Fig. 26C). Males of *A. lehtineni* resemble those of *A. grandidieri* by the nearly trapezoidal bulb, with a dorsally convex outline, but the palpal femur and tibia are relatively shorter, the latter one bearing a strongly incrassate ventrodiscal seta (Fig. 27) (palpal tibia length/height: 2.05). Females differ from other species by the oblique pore-bearing areas of the inner spermathecae (Fig. 28).

Description. Male holotype from Réserve Spéciale de Cap Sainte Marie, Toliara, Madagascar (CAS 9014164). Coloration yellowish cream except where noted. Carapace lined with brown, with brown pattern extending from the eyes to the posterior border of the carapace. Chelicerae with anterior brown patch. Labium, endites and anterior margin of sternum densely stippled with brown. Sternum cream. Legs with



Figure 26. *Andoharano lehtineni* sp. nov., habitus. A–C. Male holotype (CAS 9014164). A. Dorsal. B. Lateral. C. Ventral. D–F. Female paratype (CAS 9004899). D. Dorsal. E. Ventral. F. Lateral. Scale bars = 0.5 mm.

diffuse brown stipples, forming ill-defined rings on femora and two rings on tibiae and metatarsi. Abdomen dorsum with seven stippled brown chevron markings; venter cream with two brown bands siding the spinnerets and two brown markings near the book lung spiracles. Anterior margin of the carapace slightly truncate. Sternum subrounded, sigilla not visible. Total length 2. Carapace length 0.85, width 0.72. Clypeus length 0.13. Eye diameters: AME 0.07; PME 0.06; ALE 0.09; PLE 0.07. Sternum length 0.54, width 0.51. Palp: femur length 0.6, height 0.13; tibia length 0.35, height 0.17. Leg I: femur 1.74. II: fe 1.21; pa 0.3; missing from tibia. III: fe 1.01. IV: fe 1.39.

Abdomen: length 1.16, width 0.77. Leg II missing. Leg macrosetae unobservable. Palp: cymbium convex, small, ventrally reduced, with a retrolateral forelock of setae; bulb piriform, trapezoidal; sperm duct with two coils, the distal one forming a retrolateral bend; paraembolic lamina absent; embolus almost straight, long, curved retrolaterally; tibia widest distally, short, with several strong apical setae in ventral face, one of them very incrassate. State of the specimen: bad, all legs but left leg III missing from tibia, left palp dissected.

Female paratype from Réserve Spéciale de Cap Sainte Marie, Toliara, Madagascar

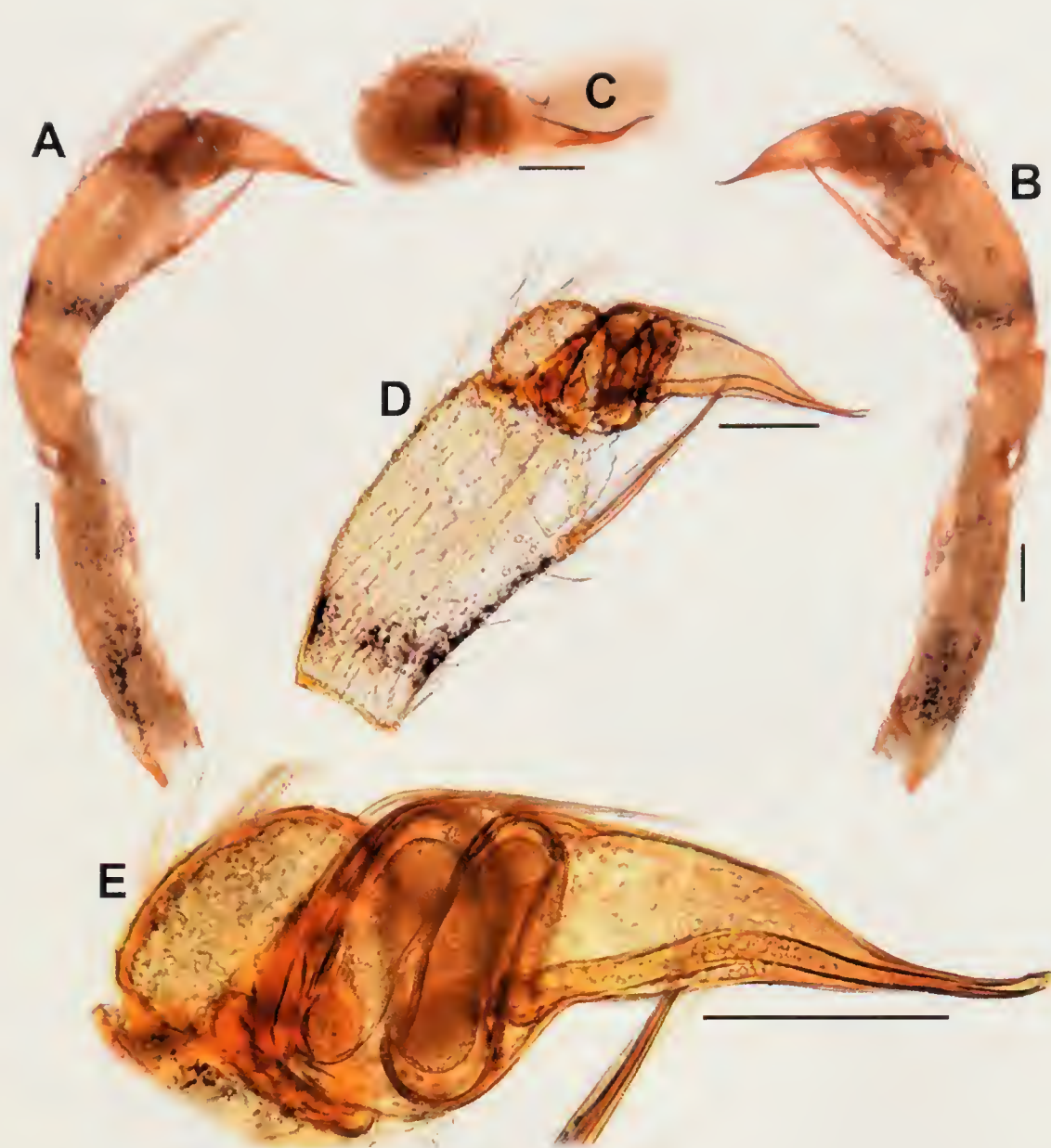


Figure 27. *Andoharano lehtineni* sp. nov., male holotype (CAS 9014164), left palp. A. Prolateral. B. Retrolateral. C. Dorsal. D. Prolateral, clove oil cleared. E. Bulb, prolateral, clove oil cleared. Scale bars = 0.1 mm.

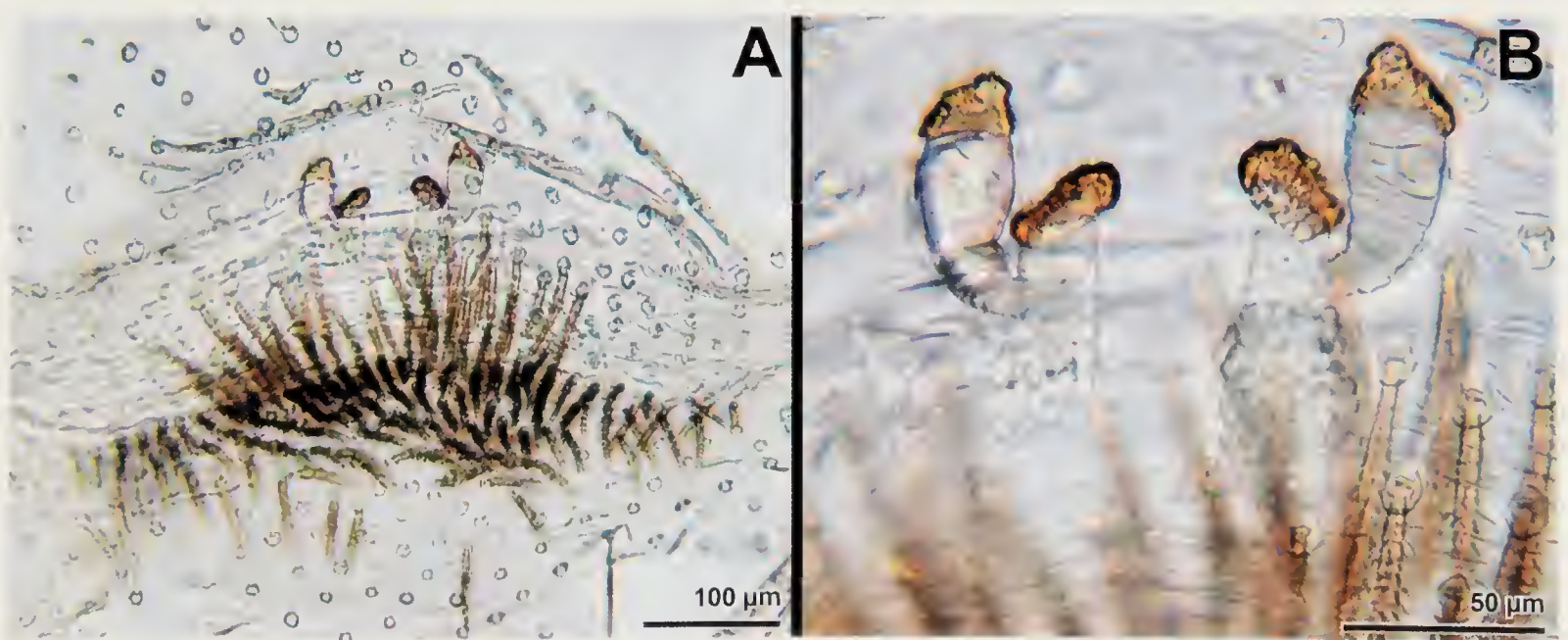


Figure 28. *Andoharano lehtineni* sp. nov., female paratype (CAS 9004899), spermathecae, dorsal view.

(CAS 9004899). Coloration as in male, except for more intense brown coloration. Anterior margin of the carapace unmodified. Sternum subrounded, sigilla not visible. Total length 2.17. Carapace length 1.03, width 0.81. Clypeus length 0.23. Eye diameters: AME 0.07; PME 0.06; ALE 0.1; PLE 0.076. Sternum length 0.59, width 0.57. Palp: femur length 0.59, height 0.19; tibia length 0.35, height 0.2. Leg I: femur 1.22. II: fe 0.89; pa 0.31; ti 0.74; mt 0.61; ta 0.42. III: fe 0.79. IV: fe 1.08. Abdomen: length 1.18, width 0.76. Leg macrosetae absent. Calamistrum with most setae missing, but seemingly with at least 10 in each row. Interpulmonary fold sub-squarish, with straight anterior margin; spermathecae with free membranous bases; inner spermathecae short, digitiform, with glandular pores restricted to a flattened area in the apical portion; outer spermathecae long, oval, with pores restricted to apical portion. State of the specimen: good, right palp and left legs III and IV missing from tibia; genitalia dissected and kept in a microvial.

Variation. Females ($N = 2$): total length 2.17–2.62 (2.4), carapace length 1.03–1.11 (1.07), femur I length 1.22–1.33 (1.28), femur/carapace ratio 1.18–1.2 (1.19).

Distribution and Natural History. Known only from Réserve Spéciale de Cap Sainte Marie, Toliara, Madagascar (Fig. 1). Specimens have been collected by pitfall traps and litter sifting in spiny forest.

Other Material Examined. None.

Andoharano woodae sp. nov.
Figures 1, 29–31

Holotype. **MADAGASCAR. Fianarantsoa:** Isalo National Park, north end [22.46545°S, 45.26186°E], V. Roth, 25/V/1992, 1 ♂ in the same vial as 2 ♀ paratypes (CAS 9057833).

Paratypes. **MADAGASCAR. Fianarantsoa:** Isalo National Park, Sahafana R. Forest [22.46545°S, 45.26186°E], B. Roth & V. Roth, 23–25/V/1992, 1 ♀ (CAS 9057825).

Etymology. The specific epithet is a matronymic in honor of the U.S. arachnologist Hannah Wood, in recognition of her contributions on the Malagasy spider fauna, especially on the iconic family Archaeidae.

Diagnosis. Males differ from all the remaining species by the almost straight embolus in lateral view (Fig. 30); females by the long and nearly digitiform inner spermathecae (Fig. 31).

Description. Male holotype from Isalo National Park, Toliara, Madagascar (CAS 9057833). Coloration yellowish cream, except where noted. Carapace lined with brown, with brown pattern extending from the eyes to the posterior border of the carapace. Chelicerae with anterior brown patch. Sternum cream. Legs with faint, light brown, open rings: three on femora, two on tibiae, and a distal one in the metatarsi. Abdomen dorsum with five dark brown chevron markings; venter cream, with two bands siding the spinnerets. Anterior margin of the carapace slightly truncate. Sternum subrounded, sigilla not visible. Total length 2.42. Carapace length 1.13, width 0.92. Clypeus length 0.14. Eye diameters: AME 0.086; PME 0.078; ALE 0.1; PLE 0.098. Sternum length 0.68, width 0.59. Palp: femur length 0.79, height 0.16; tibia length 0.53, height 0.19. Leg I: femur 2.57. II: fe 1.67; pa 0.38; ti 1.64; mt 1.31; ta 0.74. III: fe 1.39. IV: fe 1.91. Abdomen: length 1.36, width 0.96. Metatarsus II with strong retrolateral condyle. Leg macrosetae unobservable, absent at least in leg II. Palp: cymbium convex, small, ventrally reduced, with a retrolateral forelock of setae; bulb piriform, conical; sperm duct with two coils, the distal one forming a retrolateral bend; paraembolic lamina absent; embolus almost straight, curved retrolaterally; tibia widest distally, with 4–5 strong, incrassate apical setae in ventral face. State of the specimen: poor, all legs except for second pair missing from tibia, abdomen partially crushed, left palp dissected.

Female paratype from Isalo National Park, Toliara, Madagascar (CAS 9057833). Color-



Figure 29. *Andoharano woodae* sp. nov., habitus. A–C. Male holotype (CAS 9057833). A. Dorsal. B. Lateral. C. Ventral. D–F. Female paratype (CAS 9057833). D. Lateral. E. Dorsal. F. Ventral. Scale bars = 1 mm.

ation as in male, except for more intense brown pigment. Anterior margin of the carapace unmodified. Sternum subrounded, sigilla not visible. Total length 3.96. Carapace length 1.2, width 0.93. Clypeus length 0.24. Eye diameters: AME 0.08; PME 0.069; ALE 0.12; PLE 0.08. Sternum length 0.64, width 0.59. Palp: femur length 0.65, height 0.19; tibia length 0.4, height 0.19. Leg I: femur 1.47. II: fe 1.04; pa 0.27; ti 0.94; mt 0.77; ta 0.6. III: fe 0.92. IV: fe 1.3. Abdomen: length 2.73, width 1.73. Leg macrosetae absent. Calamistrum with most setae missing. Inter-

pulmonary fold sub-squarish, with straight anterior margin; spermathecae with free membranous bases; inner spermathecae digitiform, tapering toward apex, slightly sinuous, with long membranous portion, with glandular pores restricted to the apical portion; outer spermathecae short, suboval, with an annulated stalk, with pores restricted to apical portion. State of the specimen: poor, most legs missing from the tibia; genitalia dissected and kept in a microvial.

Variation. Females ($N = 3$): total length 2.8–3.96 (3.19), carapace length 1.2–1.31

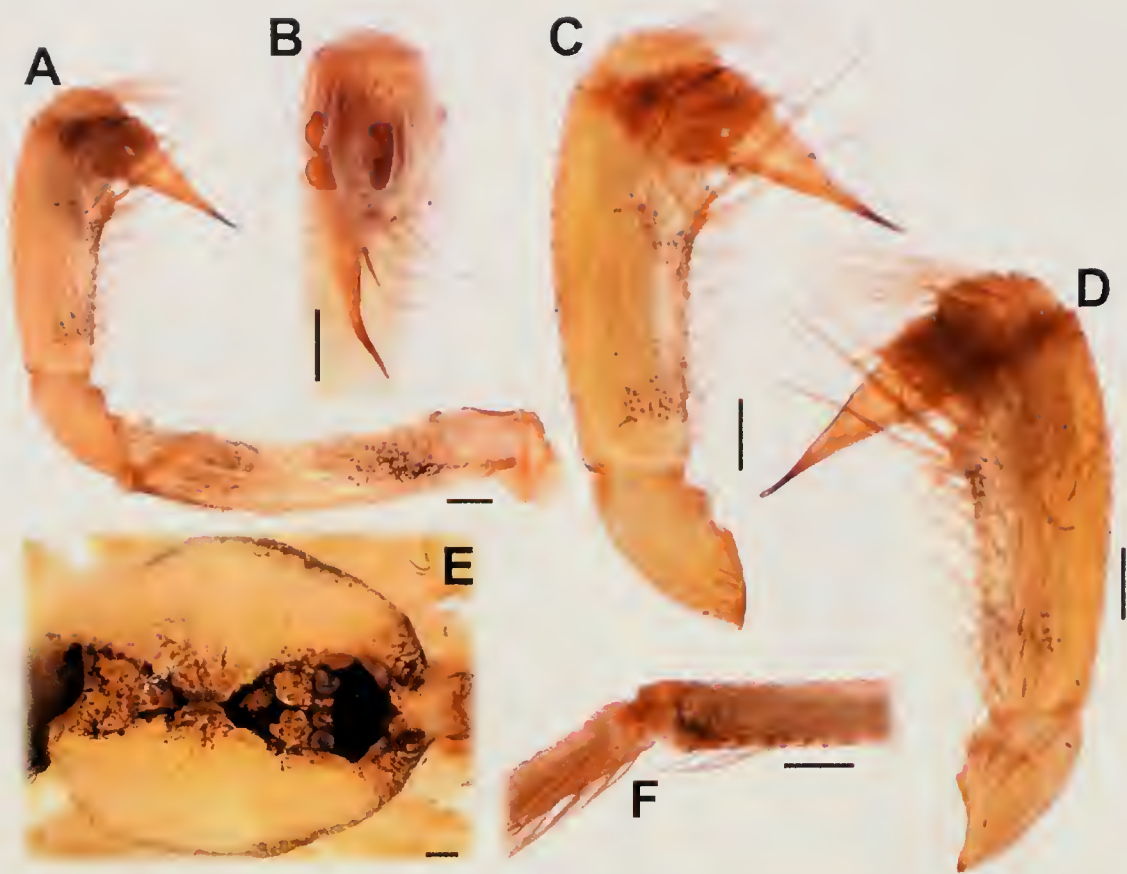


Figure 30. *Andoharano woodae* sp. nov., male holotype (CAS 9057833). A–D. Left palp. A. Prolateral. B. Dorsal. C. Prolateral. D. Retrolateral. E. Carapace, dorsal. F. Left metatarsus II, apex, retrolateral. Scale bars = 0.1 mm.

(1.26), femur I length 1.47–1.67 (1.56), femur/carapace ratio 1.2–1.27 (1.23).

Distribution and Natural History. Known only from Isalo National Park, Toliara, Madagascar (Fig. 1).

Other Material Examined. None.

Andoharano rollardae sp. nov.
Figures 1, 32–34

Andoharano milloti Legendre, 1971: 646. Mis-identified in part.

Holotype. MADAGASCAR. grotte d’Ankarika [13.01971°S, 49.07519°E], J. Millot,

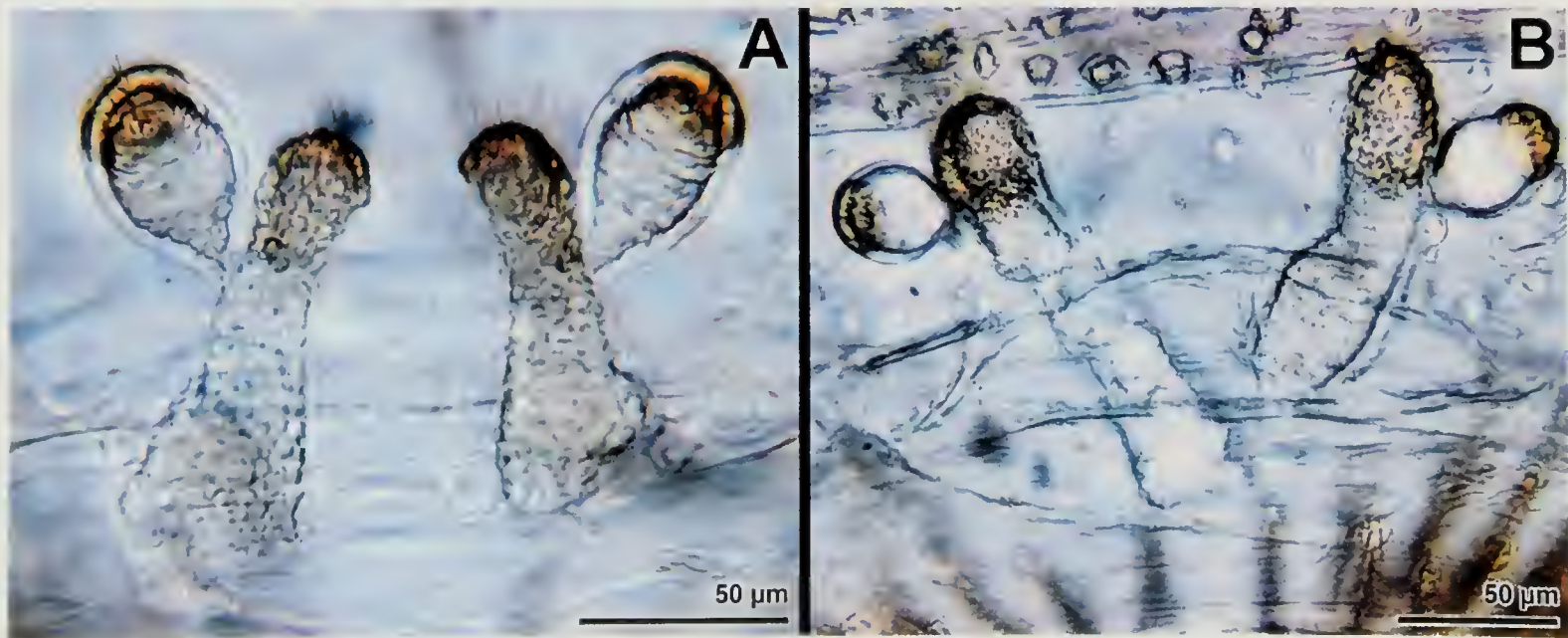


Figure 31. *Andoharano woodae* sp. nov., spermathecae, dorsal view. A. Female paratype (CAS 9057833). B. Female from Fianarantsoa, Isalo National Park (CAS 9057825).

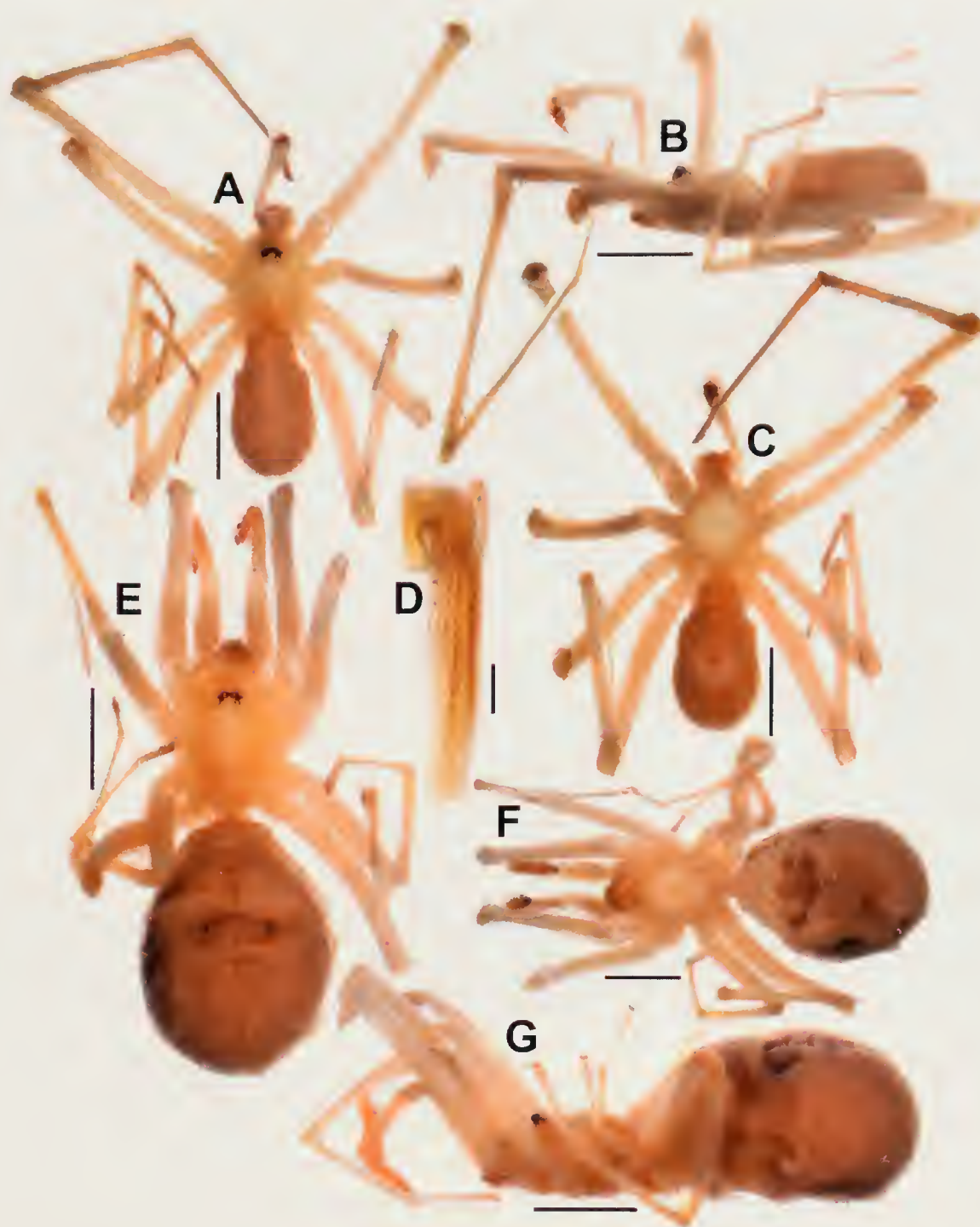


Figure 32. *Andoharano rollardae* sp. nov., habitus. A–C. Male holotype (MNHN AR 5465, misidentified paratype of *A. milloti*). A. Dorsal. B. Lateral. C. Ventral. D–G. Female paratype (MNHN AR 5464, misidentified paratype of *A. milloti*). D. Right calamistrum, retrolateral. E. Dorsal. F. Ventral. G. Lateral. Scale bars = 1 mm, except for D, scale bar = 0.1 mm.

misidentified paratypes of *A. milloti*, 1 ♂ 1 ♀ (MNHN AR5465). Literal label: MUSEUM PARIS AR5465 | *Filistata* sp.? | Madagascar: grotte d'Ankarika | J. Millot leg. (in a second label) *Andoharano milloti* n. sp. | R. Legendre det. (1971) | Paratype.

Paratypes. MADAGASCAR. Ambilobe (13.2°S, 49.06667°E), E. Ranson, XI/1971, 1 ♀ (MRAC 143003).

Remarks. In the description of *A. milloti*, Legendre (1971: 646) designated one female from Andravakobé as the holotype,

and one male and one female from Ankerika as paratypes. Re-examination of all the specimens showed that the holotype and paratypes are not conspecific; hence, the paratypes are here described as *A. rollardae*.

Etymology. The specific epithet is a matronymic in honor of the French arachnologist Christine Rollard, curator of the Muséum National d'Histoire Naturelle (Paris), in gratitude to her cordiality and help during the visit made by the second

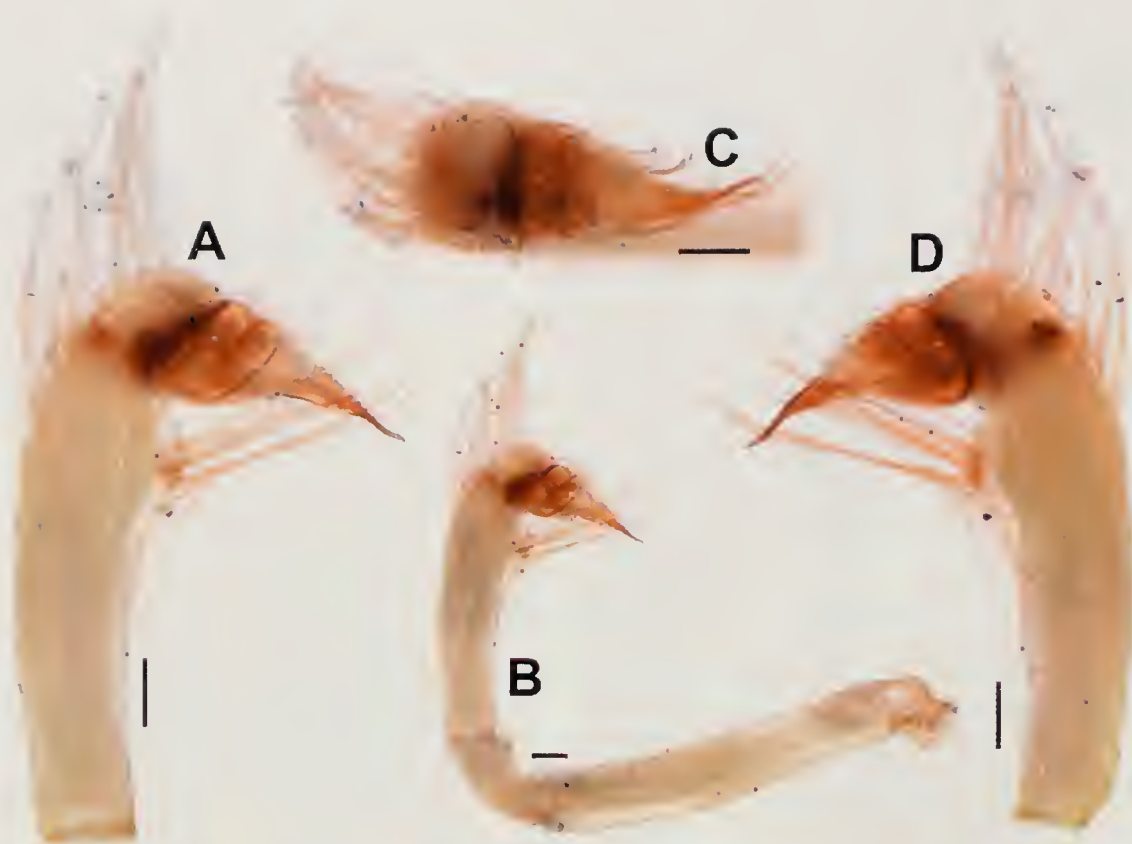


Figure 33. *Andoharano rollardae* sp. nov., male holotype (MNHN AR 5465, misidentified paratype of *A. milloti*), palp. A, B. Prolateral. C. Dorsal. D. Retrolateral. Scale bars = 0.1 mm.

author to the important collection that is under her care.

Diagnosis. The male palp is similar to that of *A. griswoldi* by the almost straight embolus, only slightly curved ventro-retrolaterally, but all palpal articles are relatively longer (Fig. 33) (palpal tibia length/height: 4.5). Females also resemble those of *A. griswoldi* by the inner spermathecae not tapering toward apex, with glandular pores restricted to a small flattened area in the apical portion, but the inner spermathecae are relatively longer and the outer spermathecae are oval rather than globose (Fig. 34). Both sexes are paler and relatively long-legged (Fig. 32) (femur I/carapace length: male 2.15, female 1.44).

Description. Male holotype (misidentified paratype of *A. milloti*) from Grotte d'Ankerika, Madagascar (MNHN 5465). Carapace uniform (probably faded). Chelicerae light orange. Labium, endites and sternum cream. Legs uniformly yellowish cream. Abdomen dorsum uniformly pale orange; venter uniformly pale orange. Anterior margin of the carapace unmodified. Ster-

num suboval, sigilla not visible. Total length 2.96. Carapace length 1.34, width 1.04. Clypeus length 0.28. Eye diameters: AME 0.06; PME 0.06; ALE 0.12; PLE 0.12. Sternum length 0.8, width 0.64. Palp: femur length 1.04, height 0.18; tibia length 0.72, height 0.16. Leg I: femur 2.88. II: fe 2; pa missing from patella. III: fe 1.56. IV: fe 2.08. Abdomen: length 1.74, width 0.98. Leg II (missing). Leg macrosetae: tibia I, 1 m.r, 2 ma.r, 1 m.p, 1 ma.p. Palp: cymbium convex, small, ventrally reduced, with a retrolateral forelock of setae; bulb piriform, with globose base; sperm duct with two coils, the distal one forming a retrolateral bend; paraembolic lamina absent; embolus short, almost straight, curved retrolaterally; tibia long, widest distally, with ~8 strong apical setae in ventral face. State of the specimen: lacks both leg articles II from tibiae, and right legs I–III from tibiae; left palp dissected and kept in a microvial.

Female paratype (misidentified paratype of *A. milloti*) from Grotte d'Ankerika, Madagascar (MNHN 5465). Coloration as in male. Anterior margin of the carapace

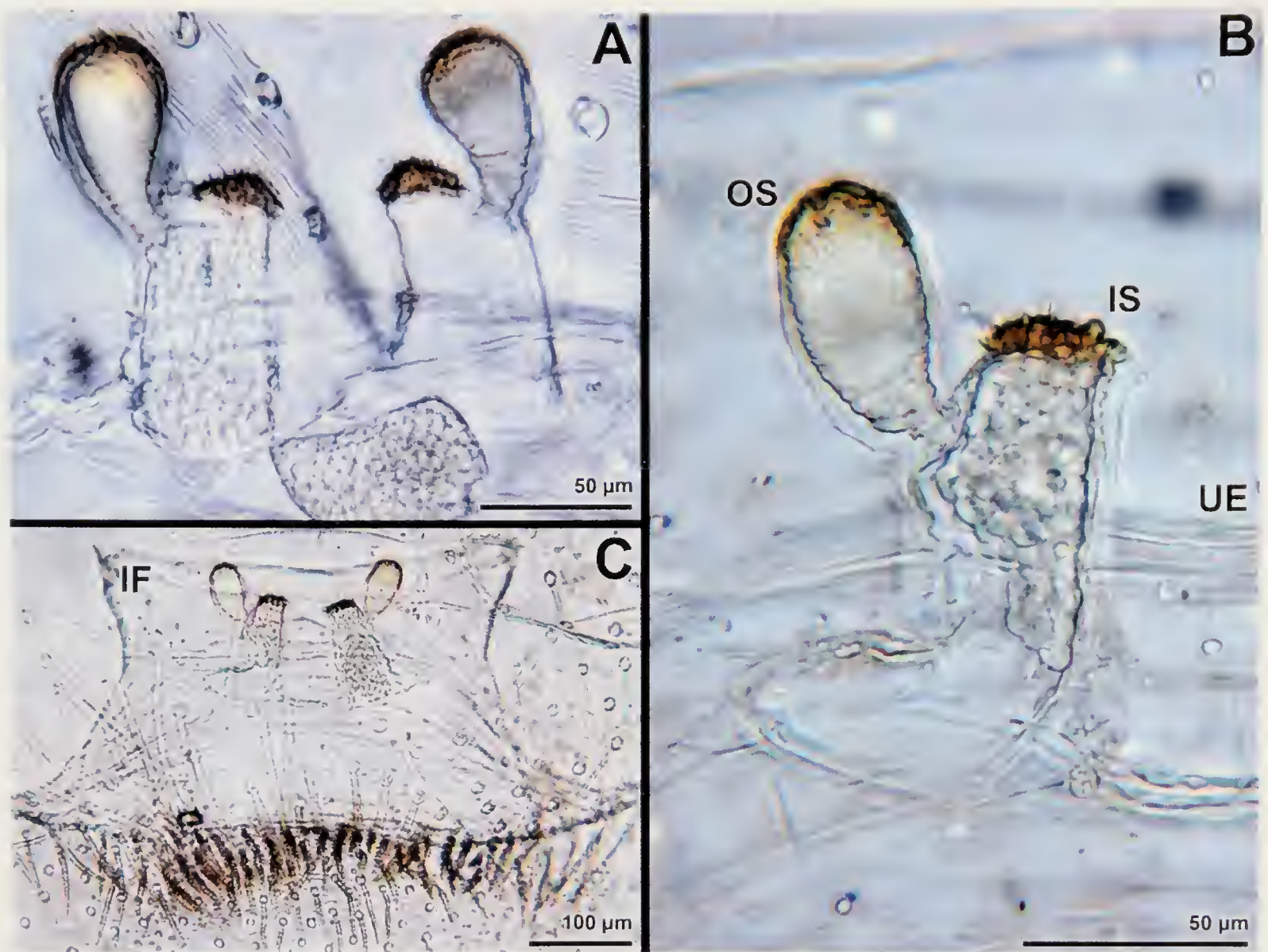


Figure 34. *Andoharano rollardae* sp. nov., spermathecae, dorsal view. A. Female paratype (MNHN AR 5465, misidentified paratype of *A. milloti*). B, C. Female from Ambilobe (MRAC 143003). Abbreviations: IF = interpulmonary fold, IS = inner spermathecae, OS = outer spermathecae, UE = uterus externus.

unmodified. Sternum subrounded, sigilla not visible. Total length 4.08. Carapace length 1.44, width 1.18. Clypeus length 0.24. Eye diameters: AME 0.06; PME 0.06; ALE 0.1; PLE 0.08. Sternum length 0.82, width 0.72. Palp: femur length 1.04, height 0.24; tibia length 0.64, height 0.18. Leg I: femur 2.08. II: fe 1.44. III: fe 1.34. IV: fe 1.74. Abdomen: length 2.52, width 1.88. Leg macrosetae absent. Calamistrum with three rows with 15-12-11 (inner to outer row). Interpulmonary fold sub-squarish, with straight anterior margin; spermathecae with free membranous bases; inner spermathecae digitiform, not tapering toward apex, with glandular pores restricted to a small flattened area in the apical

portion; outer spermathecae globose, with an annulated stalk, with pores restricted to apical portion. State of the specimen: damaged, decolored, many legs detached; genitalia dissected and kept in a microvial.

Variation. Females ($N = 2$): total length 3.8–4.08 (3.94), carapace length 1.44–1.45 (1.45), femur I length 2.08–2.86 (2.47), femur/carapace ratio 1.44–1.97 (1.71). The female from Ambilobe has longer legs, smaller AME, a faint V-shaped median pattern in the carapace, and a faint chevron in the abdomen. We are not entirely certain it is conspecific with the couple from the type locality.

Distribution and Natural History. Known only from caves in the Antsiranana region, Madagascar (Fig. 1).

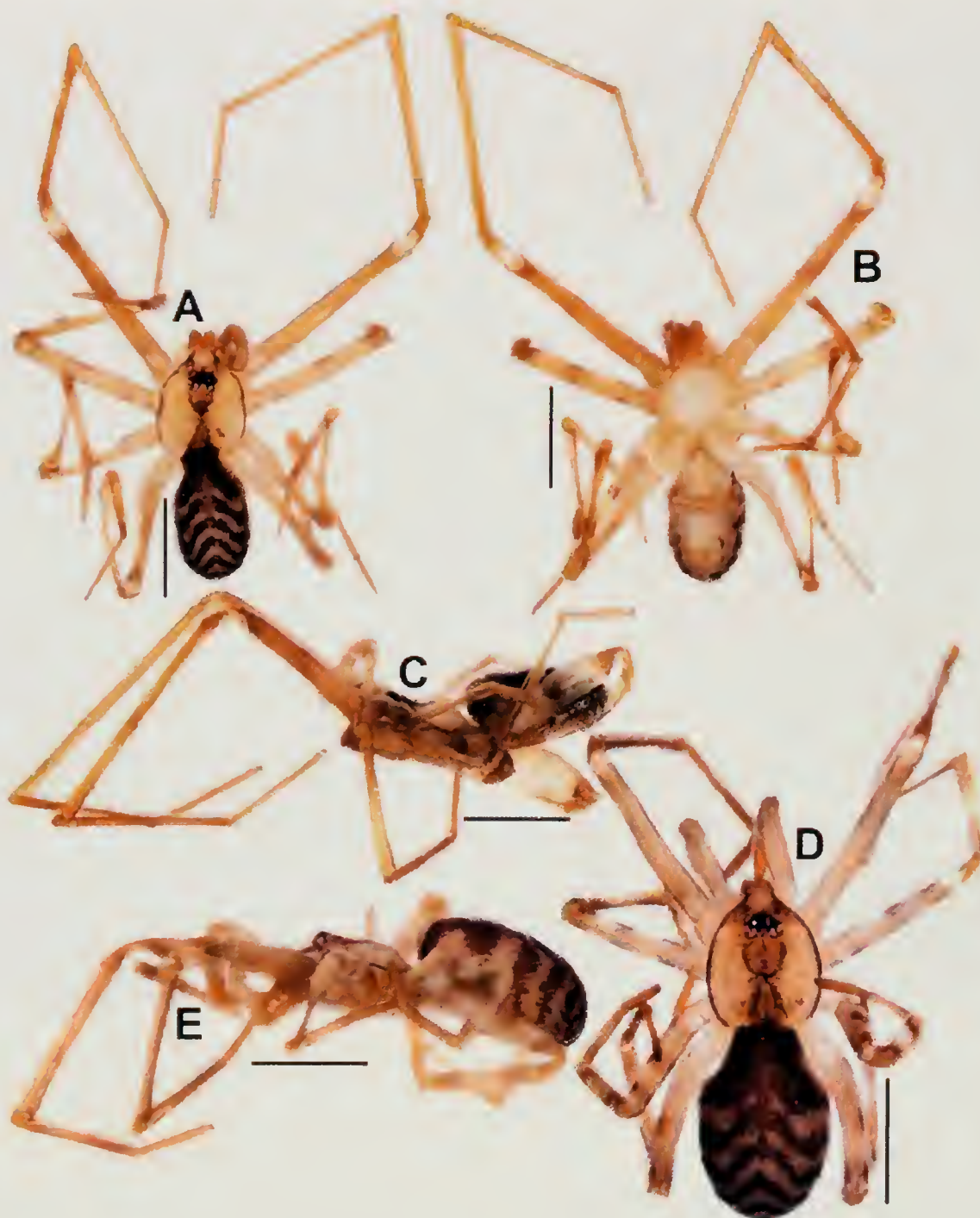


Figure 35. *Andoharano griswoldi* sp. nov., habitus. A–C. Male holotype (CAS 9060644). A. Dorsal. B. Ventral. C. Lateral. D, E. Female paratype (CAS 9060644). D. Dorsal. E. Lateral. Scale bars = 1 mm.

Other Material Examined. None.

Andoharano griswoldi sp. nov.
Figures 1, 4, 7, 8B, 11, 35–37

Holotype. **MADAGASCAR.** *Antsiranana:* *Reserve Analamenara*, 28.4 km 99° Anivorano-Nord, tropical dry forest, sifted litter with leaf mold and rotten wood (12.74667°S, 49.49472°E, 60 m), B. L. Fisher, 5/XII/2004, 1 ♂ in the same vial as 2 ♀ paratypes (CAS 9060644).

Paratypes. **MADAGASCAR.** *Antsiranana:* same data as the holotype, 6 ♀ 8 imm. (CAS 9064999); 7.2 km SE *Antsiranana*, *Montagne des Français* (12.32278°S, 49.33817°E, 180 m), L. J. Bountin, 23–25/II/2001, 6 ♀ 4 imm. (CAS 9000850); *Antsaraingy* (12.90361°S, 49.65917°E, 66 m), B. L. Fisher et al., 21–23/X/2013, 1 ♀ 5 imm. (CAS 9064976); *Foret D’Orangea*, dry forest (12.25889°S, 49.37472°E, 90 m), L. J. Bountin, 22–28/II/2001, 1 ♀ 2 imm. (CAS 9003165).

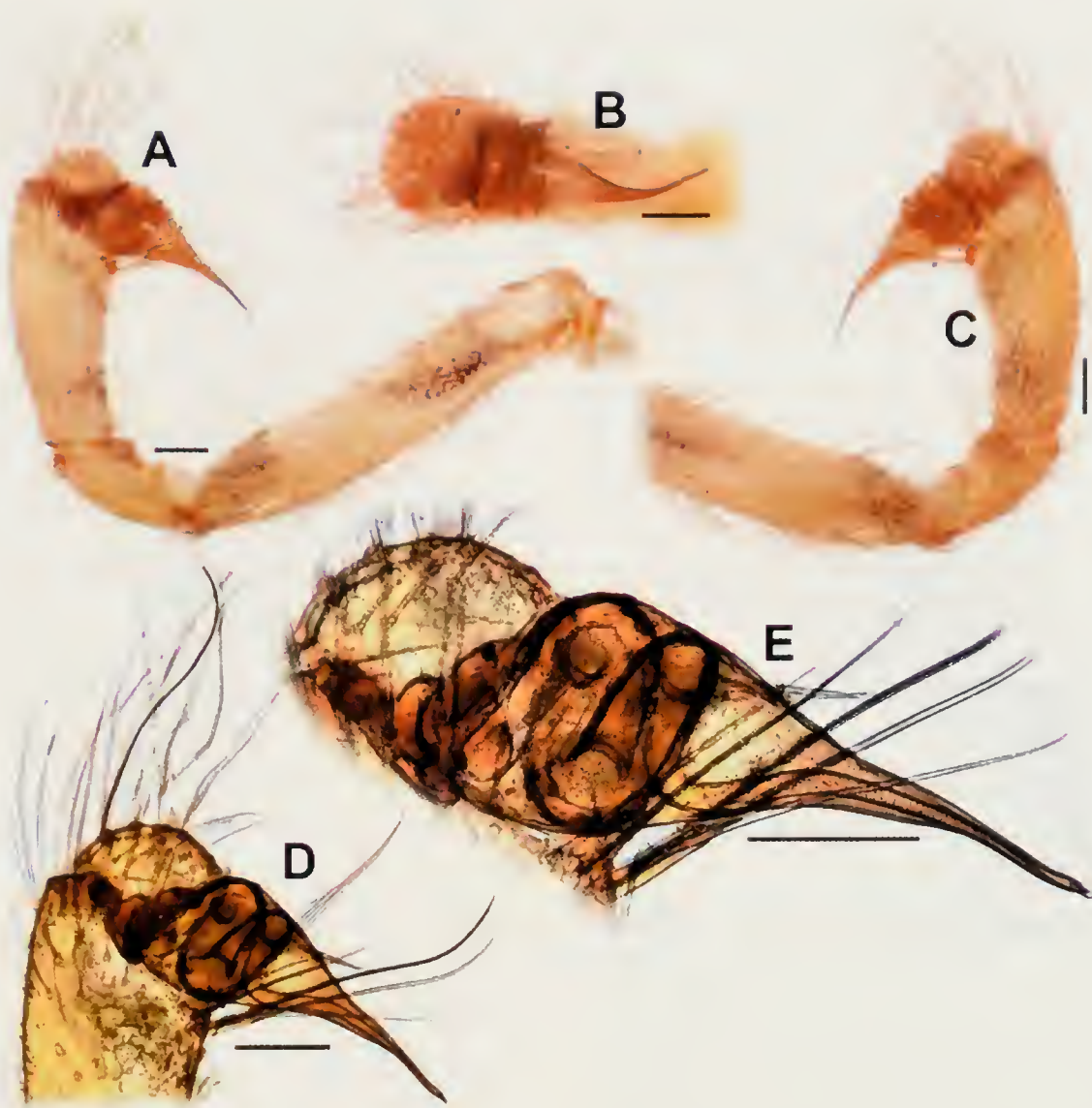


Figure 36. *Andoharano griswoldi* sp. nov., male holotype (CAS 9060644), left palp. A. Prolateral. B. Dorsal. C. Retrolateral. D, E. Prolateral, clove oil cleared. Scale bars = 0.1 mm.

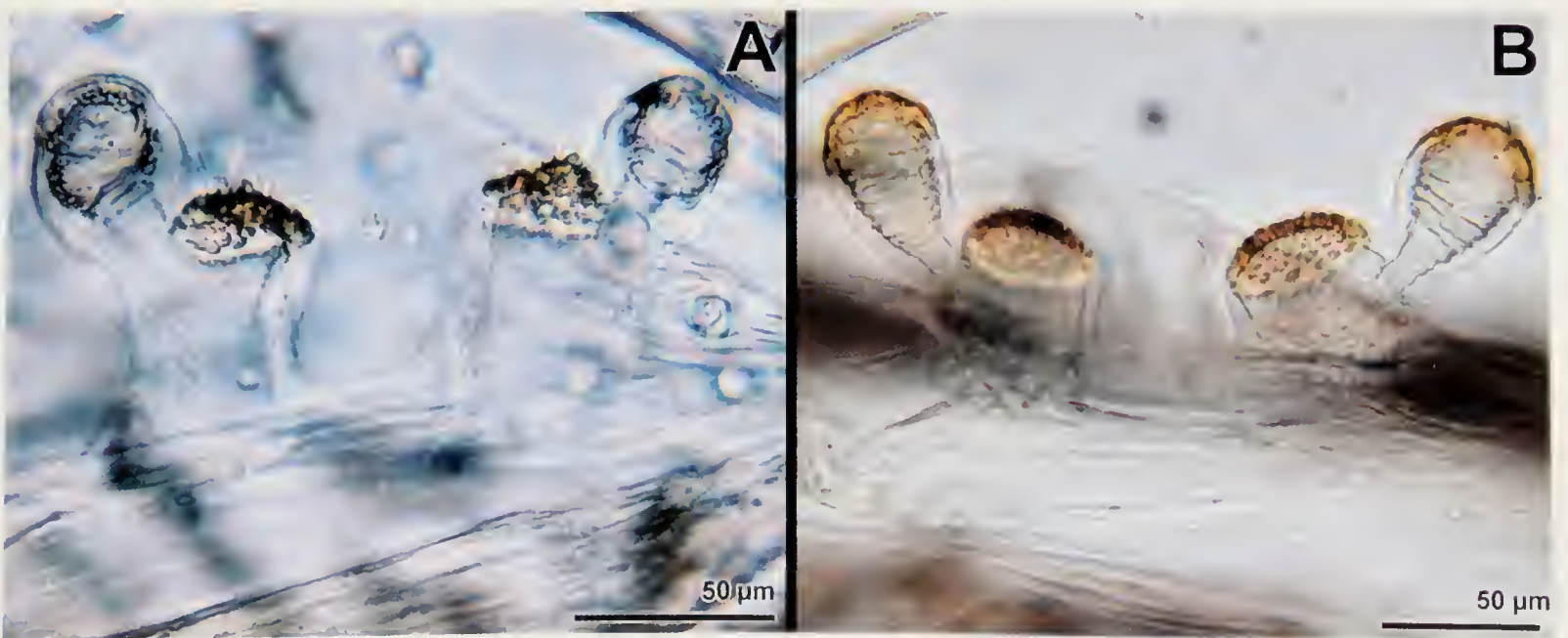


Figure 37. *Andoharano griswoldi* sp. nov., spermathecae, dorsal view. A. Female paratype (CAS 9060644). B. Female from Antsiranana, Montagne des Français (CAS 9000850).

Etymology. The specific epithet is a patronymic in honor of the U.S. arachnologist Charles Griswold, in recognition of his fundamental contributions to spider systematics, including many works on the Malagasy fauna.

Diagnosis. The male palp is similar to that of *A. rollardae* by the almost straight embolus, only slightly curved ventro-retrolaterally, but all palpal articles are relatively shorter (Fig. 36) (palpal tibia length/height: 2.6). Females also resemble to those of *A. rollardae* by the inner spermathecae not tapering toward apex, with glandular pores restricted to a small flattened area in the apical portion, but the outer spermathecae are globose rather than oval (Fig. 37). Both sexes have more contrasting pattern and are relatively short-legged (Fig. 35) (femur I/carapace length: male 1.79, female 1.35).

Description. Male holotype from Reserve Analamenara, Antsiranana, Madagascar (CAS 9060644). Carapace lined with brown, with brown pattern extending from the eyes to the posterior border of the carapace. Chelicerae with faint anterior brown patch. Sternum whitish cream. Legs with diffuse brown stipples, forming ill-defined rings on femora and two rings on tibiae and metatarsi. Abdomen dorsum with six brown chevron markings; venter cream, with two bands siding the spinnerets. Anterior margin of the carapace slightly truncate. Sternum subrounded, sigilla not visible. Total length 2.23. Carapace length 1.11, width 0.87. Clypeus length 0.22. Eye diameters: AME 0.092; PME 0.07; ALE 0.11; PLE 0.09. Sternum length 0.69, width 0.65. Palp: femur length 0.76, height 0.15; tibia length 0.44, height 0.17. Leg I: femur 1.99. II: fe 1.36; pa 0.34; ti 1.39; mt 1.04; ta 0.67. III: fe 1.04. IV: fe 1.39. Abdomen: length 1.3, width 0.758. Metatarsus II with strong retrolateral condyle. Leg macrosetae: tibiae I, 1 m.r, 1 ma.r, 1 m.p, 1 ma.p. Palp: cymbium convex, small, ventrally reduced, with a retrolateral forelock of setae; bulb piriform, with globose base; sperm duct

with two coils, the distal one forming a retrolateral bend; fundus ventrally pointed; paraembolic lamina absent; embolus long, almost straight, curved retrolaterally; tibia widest distally, with ~8 strong apical setae in ventral face. State of the specimen: good, left palp and left leg II dissected, right leg II missing from tibia.

Female paratype from Reserve Analamenara, Antsiranana, Madagascar (CAS 9060644). Coloration as in male. Anterior margin of the carapace unmodified. Sternum subrounded, sigilla not visible. Total length 2.54. Carapace length 1.06, width 0.88. Clypeus length 0.2. Eye diameters: AME 0.075; PME 0.071; ALE 0.11; PLE 0.067. Sternum length 0.6, width 0.53. Palp: femur length 0.64, height 0.2; tibia length 0.42, height 0.17. Leg I: femur 1.43. II: fe 0.98; pa 0.29; ti 0.84; mt 0.69; ta 0.57. III: fe 0.83. IV: fe 1.2. Abdomen: length 1.52, width 1.01. Leg macrosetae absent. Calamistrum with three rows, number of setae difficult to count, but seemingly between 10 and 14 in each row. Interpulmonary fold sub-squarish, with straight anterior margin; spermathecae with free membranous bases; inner spermathecae digitiform, not tapering toward apex, with glandular pores restricted to a flattened area in the apical portion; outer spermathecae globose, with an annulated stalk, with pores restricted to apical portion. State of the specimen: good; genitalia dissected and kept in a microvial.

Variation. Females ($N = 5$): total length 2.13–3.14 (2.6), carapace length 0.99–1.49 (1.13), femur I length 1.25–1.91 (1.51), femur/carapace ratio 1.26–1.44 (1.34).

Distribution and Natural History. Known from the extreme north of Madagascar in Antsiranana province (Fig. 1). Specimens have been collected by litter sifting in dry forests.

Other Material Examined. None.

Andoharano milloti Legendre, 1971
Figures 1, 38–39

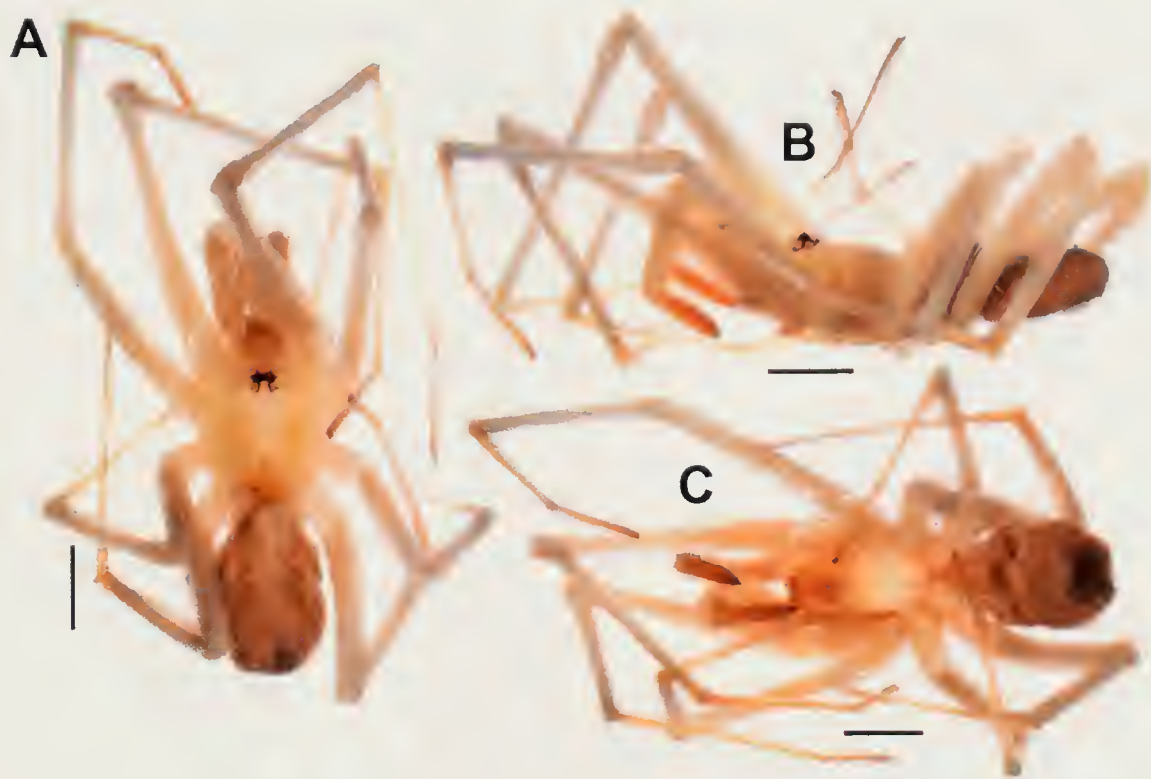


Figure 38. *Andoharano milloti* Legendre, 1971, female holotype (MNHN AR 5464), habitus. A. Dorsal. B. Lateral. C. Ventral. Scale bars = 1 mm.

Andoharano milloti Legendre, 1971: 646, fig. 1.

Holotype. **MADAGASCAR. Ankara:** *Grotte obscure d'Andavakobe* [12.91686°S, 49.16673°E], J. Millot, III/1946, 1 ♀ (MNHN AR5464). Literal label: MUSEUM PARIS AR5464 | *Filistata decayri* Fage | Madagascar: grotte obscure d'Andavakobe | (Ankara) - J. Millot rec., III - 1946 / (in a

second label) *Andoharano milloti* n. sp. | R.Legendre det. (1971) | Holotype.

Remarks. The paratypes designated by Legendre (1971) are not conspecific with the holotype and are here described as a separate species (see *A. rollardae* above). Thus, the holotype becomes the only known specimen.

Diagnosis. The female is distinguished by the very short inner spermathecae and by

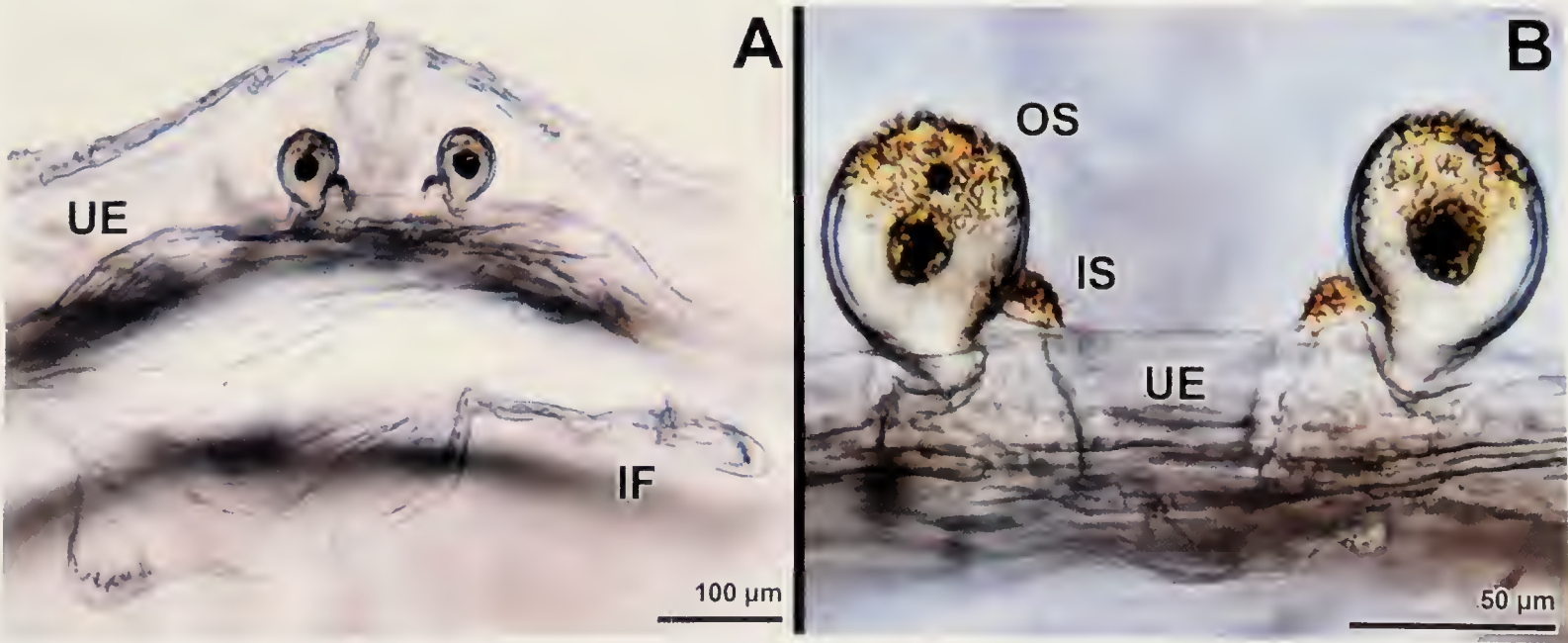


Figure 39. *Andoharano milloti* Legendre, 1971, female holotype (MNHN AR 5464), spermathecae, dorsal view. Abbreviations: IF = interpulmonary fold, IS = inner spermathecae, OS = outer spermathecae, UE = uterus externus.

the outer spermathecae almost spherical, with an annulated, short stalk (Fig. 39).

Description. Female holotype from Grotte obscure d'Andavakobe, Madagascar (MNHN AR 5464). Coloration cream. Carapace uniform (probably faded). Chelicerae light orange. Labium slightly darker than sternum. Endites and sternum cream. Legs uniformly cream. Abdomen dorsum uniformly cream; venter uniformly cream. Anterior margin of the carapace unmodified. Sternum subrounded, sigilla not visible. Total length 4.12. Carapace length 1.86, width 1.64. Clypeus length 0.4. Eye diameters: AME 0.08; PME 0.08; ALE 0.16; PLE 0.12. Sternum length 1.1, width 0.82. Palp: femur length 1.5, height 0.38; tibia length 0.84, height 0.26. Leg I: femur 3.56. II: fe 2.64. III: fe 2.2. IV: fe 2.72. Abdomen: length 2.22, width 1.34. Leg macrosetae absent. Interpulmonary fold sub-squarish, with straight anterior margin; spermathecae with free membranous bases; inner spermathecae short, subtriangular, with glandular pores restricted to the apical portion; outer spermathecae subrounded, with pores restricted to apical portion. State of the specimen: decolored, lacking most setae; genitalia dissected and kept in a microvial.

Distribution and Natural History. Known from a single cave in northern Madagascar (Fig. 1).

Andoharano ramirezi sp. nov.

Figures 1, 8D, 40–42

Holotype. **MADAGASCAR. Toliara:** Réserve Privé Berenty, Forêt de Bealoka, Mandraré River, gallery forest, pitfall trap (24.95694°S, 46.27139°E, 35 m), B. L. Fisher et al., 3–8/II/2002, 1 ♂ (CAS 9014447).

Paratypes. **MADAGASCAR. Toliara:** same data as the holotype, 1 ♀ (CAS 9012512); *Makay Mts.*, Anosy region, District of Amboasary, Berenty Special Reserve, spiny forest (25.02389°S, 46.30917°E, 36 m), M.

Irwin, Rin'Ha, 15–22/XI/2003, 1 ♂ (CAS 9062630).

Etymology. The specific epithet is a patronymic in honor of the Argentinian arachnologist, our scientific mentor and good friend Martín J. Ramírez, in recognition of his contributions to the systematics of spiders in general and filistatids in particular.

Diagnosis. This species is the most distinct: the male palp has a very short and globose tibia, and a short, piriform bulb, with a strongly curved embolus, and the metatarsus II has a retrolateral excavation (Fig. 41). Females have the membranous bases of the spermathecae fused, the inner spermathecae are very small, and the outer spermathecae are spherical, laterally directed, and with the entire surface covered by glandular pores (Fig. 42).

Description. Male holotype from Réserve Privé Berenty, Toliara, Madagascar (CAS 9014447). Coloration yellowish cream except where noted. Carapace lined with brown, with brown V-shaped pattern posterior to the eyes, with diffuse posterior coloration extending to the end of the carapace, submarginal bands absent. Chelicerae with anterior brown patch. Labium finely stippled with brown. Sternum anteriorly finely stippled with brown. Legs with diffuse brown stipples, forming ill-defined spots on femora and two rings on tibiae and metatarsi. Abdomen dorsum with five chevron markings; venter cream, with two bands siding the spinnerets. Anterior margin of the carapace slightly truncate. Sternum subrounded, sigilla not visible. Total length 1.82. Carapace length 0.75, width 0.58. Clypeus length 0.11. Eye diameters: AME 0.05; PME 0.05; ALE 0.08; PLE 0.07. Sternum length 0.56, width 0.43. Palp: femur length 0.41, height 0.1; tibia length 0.21, height 0.17. Leg I: femur 1.05. II: fe 0.72; pa 0.21; ti 0.72; mt 0.56; ta 0.37. III: fe 0.59. IV: fe 0.86. Abdomen: length 1.04, width 0.79. Leg II metatarsus with a retrolateral excavation bearing some stronger

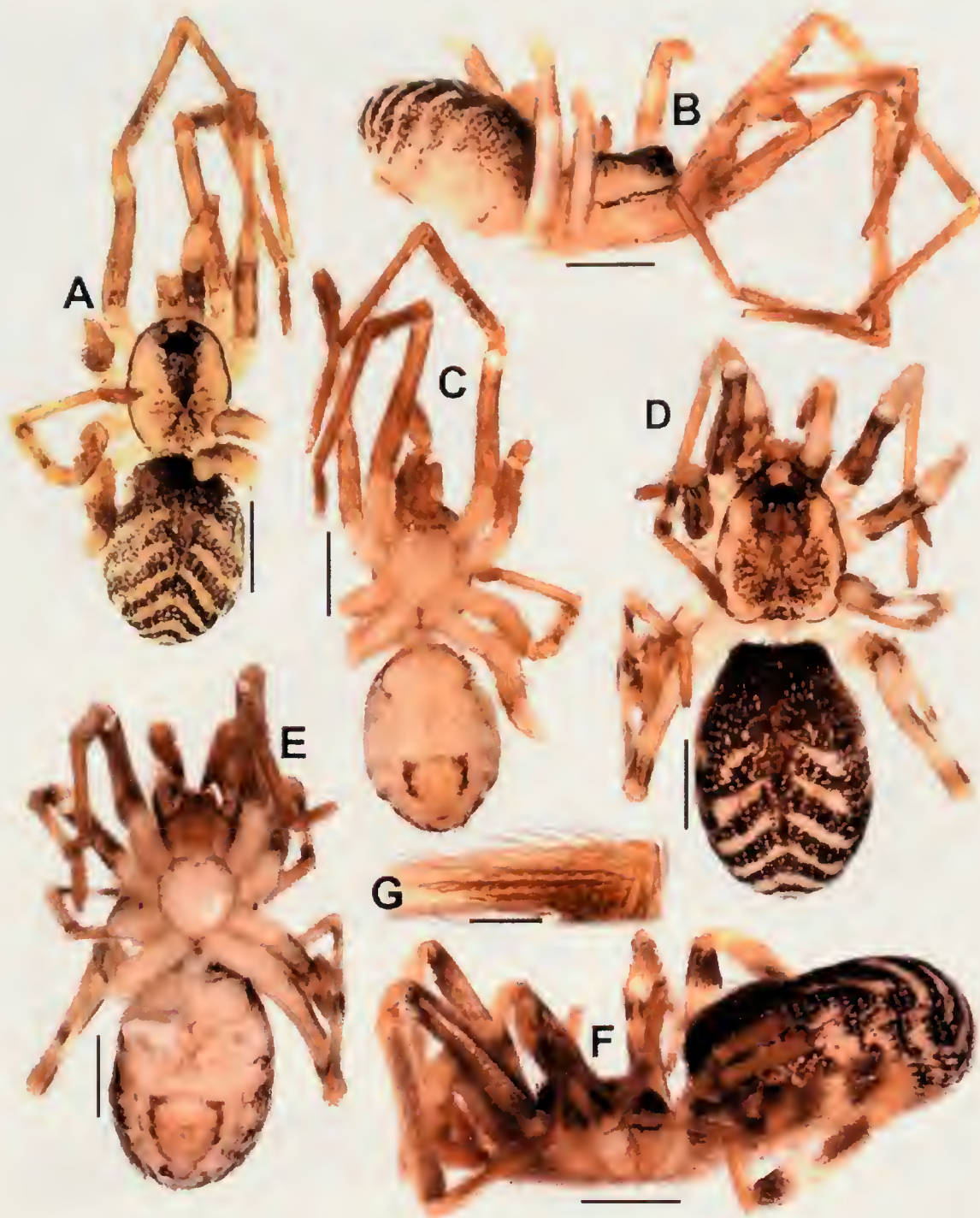


Figure 40. *Andoharano ramirezi* sp. nov., habitus. A–C. Male holotype (CAS 9014447). A. Dorsal. B. Lateral. C. Ventral. D–G. Female paratype (CAS 9012512). D. Dorsal. E. Ventral. F. Lateral. G. Right calamistrum, retrolateral, mirrored. Scale bars = 0.5 mm, except for G, scale bar = 0.1 mm.

setae proximally, with strong retrolateral condyle. Leg macrosetae absent. Palp: cymbium convex, small, ventrally reduced, with a retrolateral forelock of setae; bulb piriform, globose at base; sperm duct with two coils, the distal one forming a retrolateral bend; fundus ventrally pointed; paraembolic lamina absent; embolus ventrally curved, slender; tibia without strong setae. State of the specimen: good; left leg II, right leg III and both legs IV missing from tibia.

Female paratype from Réserve Privé Berenty, Toliara, Madagascar (CAS 9012512). Coloration as in male, except for more intense brown coloration. Carapace with brown median area. Anterior margin of the carapace unmodified. Sternum subrounded, sigilla not visible. Total length ~2.28. Carapace length 0.88, width 0.73. Clypeus length 0.16. Eye diameters: AME 0.06; PME 0.05; ALE 0.09; PLE 0.07. Sternum length 0.56, width 0.49. Palp:

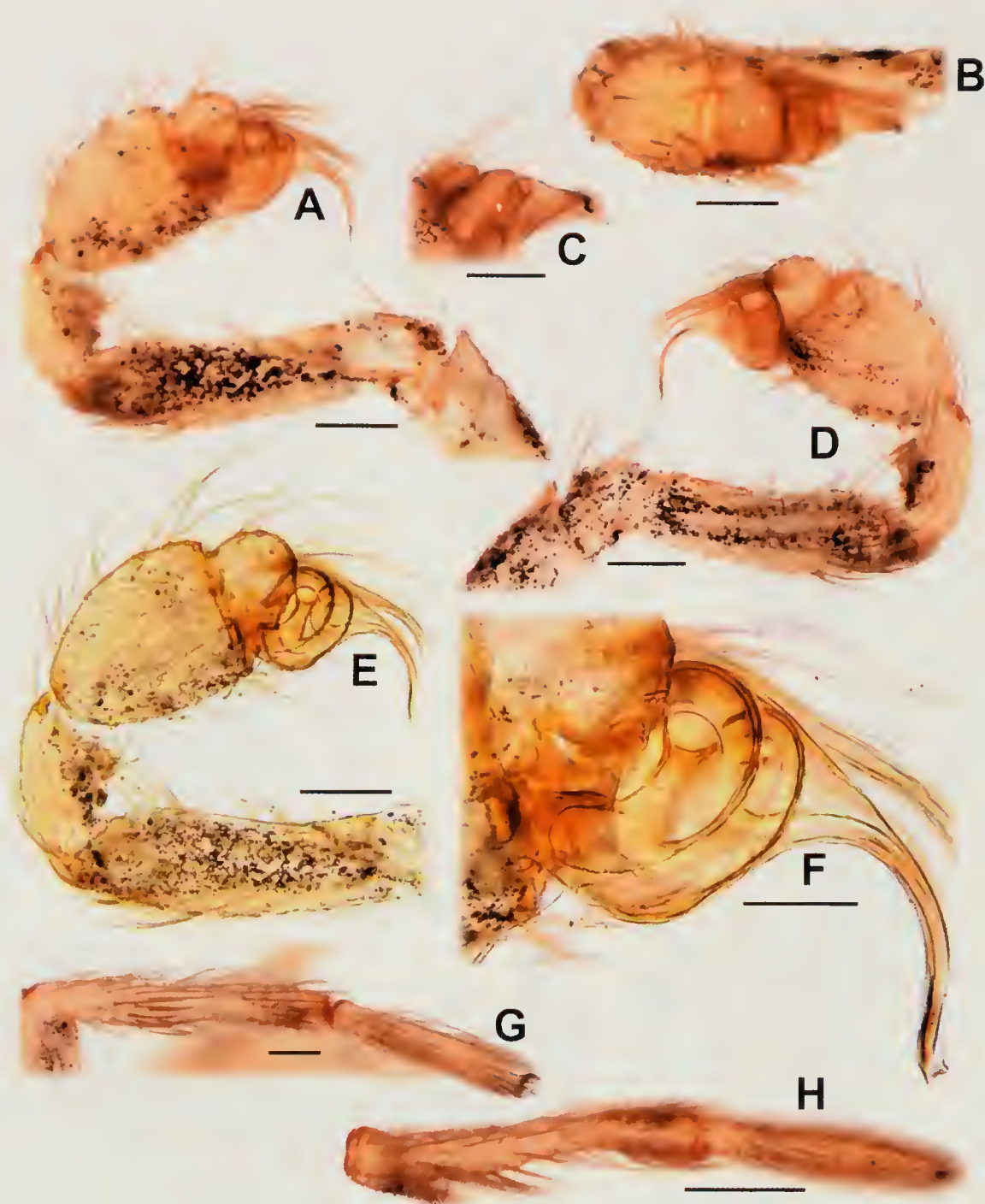


Figure 41. *Andoharano ramirezi* sp. nov., male holotype (CAS 9014447). A–F. Left palp. A. Prolateral. B. Dorsal. C. Subventral. D. Retrolateral. E. Prolateral, clove oil cleared. F. Bulb, prolateral, clove oil cleared. G. Right leg II, retrolateral. H. Right leg II, dorsal. Scale bars = 0.1 mm, except for F, scale bar = 0.05 mm.

femur length 0.51, height 0.19; tibia length 0.32, height 0.16. Leg I: femur 0.95. II: fe 0.71; pa 0.2; ti 0.61; mt 0.52; ta 0.41. III: fe 0.64. IV: fe 0.9. Abdomen: length 1.38, width 0.97. Leg macrosetae absent. Calamistrum with three rows with 8-14-10 setae (inner to outer row); with fused membranous base; receptacles globose; inner spermathecae smaller than outer spermathecae; outer spermathecae on a short stalk, with pores throughout its entire surface. State of the specimen: good, abdomen disarticulated

from cephalothorax; genitalia dissected and kept in a microvial.

Variation. Males ($N = 2$): total length 1.82–1.82 (1.82), carapace length 0.75–0.78 (0.77), femur I length 1.05–1.07 (1.06), tibia I length 1.1–1.1 (1.1), femur/carapace ratio 1.37–1.4 (1.39).

Distribution and Natural History. Known only from Réserve Privé Berenty in Toliara, Madagascar (Fig. 1). Specimens have been collected in pitfall traps in gallery forests and dry forests.

Other Material Examined. None.

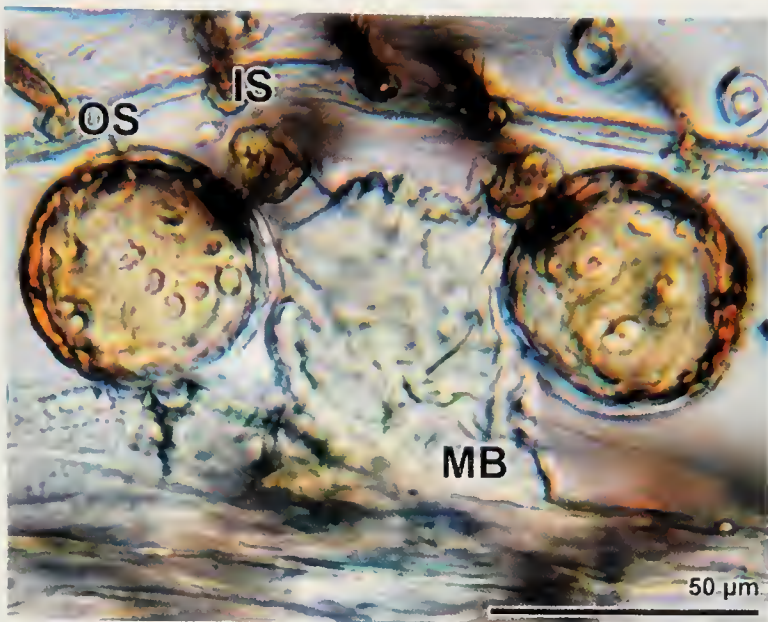


Figure 42. *Andoharano ramirezi* sp. nov., female paratype (CAS 9012512), spermathecae, dorsal view. Abbreviations: IS = inner spermathecae, MB = membranous base, OS = outer spermathecae.

Andoharano undetermined specimens

Fig. 43

During the course of this revision, we have been able to examine several *Andoharano* females and immatures from localities where males have not been collected. Some of these females appear to belong to none of the species treated above and might represent additional undescribed species. Given that diagnosing females is extremely difficult in this genus, we have chosen not to create new names for taxa with unknown males. Nevertheless, below we present a complete list of the females and immatures unassigned to the species level, in the hope that this might be useful for future workers in the genus. Some of these females have also been illustrated (see Fig. 43); the one depicted in Fig. 43D could be the unde-

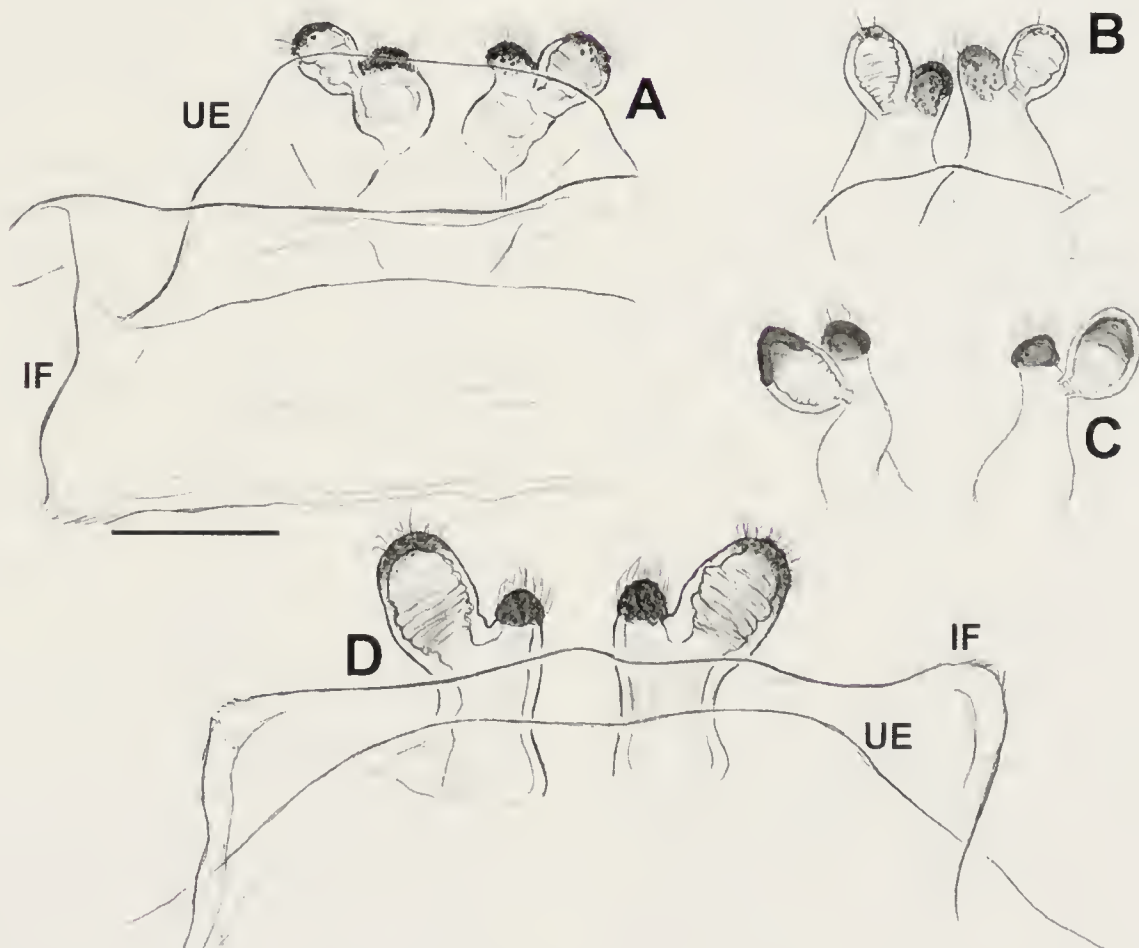


Figure 43. *Andoharano* spp., female spermathecae, dorsal view. These specimens represent likely undescribed species, not named here because there are few specimens and there are no males from the same localities; it is not unlikely that the female in D could be conspecific with the males of *A. zonsteini*. A. Toliara, Parc National Andohahela, Forêt de Manantalinjo (CAS 9012158). B. Toliara, 16.3 km SE Belo Sur Mer (CAS 9004811). C. Toliara, Ambohimahavelona village (CAS 9065186). D. Toliara, Parc National de Tsimanampetsotsa (CAS 9000423). Scale bar = 0.1 mm, all figures to scale. Abbreviations: IF = interpulmonary fold, UE = uterus externus.

scribed female of *A. zonsteini* (see remarks under this species).

Females. **MADAGASCAR. Toliara:** 16.3 km SE 127° Belo Sur Mer, tropical dry forest, leaf mold, rotten wood, beating low vegetation (20.79528°S, 44.14694°E, 80 m), B. L. Fisher et al., 6–10/XII/2001, 1 ♀ 2 imm. (CAS 9004811); *Ambohimahavelona village*, 33 km NE Tulear, dry forest, malaise trap (23.44083°S, 43.89967°E), M. Irwin & R. Harin'Hala, 18/IX–3/X/2010, 1 ♀ (CAS 9065186); *Manombo*, leaf litter in gallery forest (22.81083°S, 43.73444°E, 177 m), Frontier Wilderness Project, 30/IV–2/V/2004, 1 ♀ (CAS 9065031); (22.81222°S, 43.73944°E, 165 m), 22–24/V/2004, 1 ♀ (CAS 9064981); *Parc National Andohahela*, Forêt de Manantalinjo, spiny forest/thicket, general collecting night spiders (24.81694°S, 46.61°E, 150 m), B. L. Fisher et al., 12–16/I/2002, 1 ♀ (CAS 9012158); *Parc National de Tsimanampetsotsa*, Mitoho cave, spiny forest/thicket, general collecting night spiders (24.04722°S, 43.75306°E, 40 m), B. L. Fisher et al., 18–22/III/2002, 1 ♀ 2 imm. (CAS 9000423).

Immatures. **MADAGASCAR. Antsiranana:** *Foret D'Orangea*, 3.6 km 128° SE Remena, dry forest (12.25889°S, 49.37472°E, 90 m), Fisher-Griswold Arthropod Team, 22–28/II/2001, 1 imm. (CAS 9001032); *Grotte d'Andavakobe*, 6 imm. (MNHN AR 5463) **Toliara:** *Atsimo Andrefana*, District of Tulear II, 3 km N Andranomavo village, Mikea deciduous dry forest, malaise (20.22406°S, 45.68589°W, 33 m), Rin'Ha, M. Irwin, 3–13/X/2002, 1 imm. (CAS 9062712); *Forêt de Beroboka*, 5.9 km 131° SE Ankidranoka, tropical dry forest, leaf mold, rotten wood, litter sifting (22.23306°S, 43.36639°E), B. L. Fisher et al., 12–16/III/2002, 1 imm. (CAS 9000638); *Makay Mountains* (21.31°S, 45.12944°E, 590 m), 3–6/XII/2010, 1 imm. (CAS 9065981); *Parc National Andohahela*, Tsimelahy, primary spiny dry forest, sifting litter (24.96636°S, 46.55469°E), F. Álvarez-Padilla & H. Wood, 28/XII/2008, 1 imm.

(CAS 9030408); *Parc National de Kirindy Mite*, 16.3 km SE 127° Belo Sur Mer, tropical dry forest, general collecting ground spiders (20.79528°S, 44.14694°E, 80 m), B. L. Fisher et al., 6–10/XII/2001, 1 imm. (CAS 9004794); tropical dry forest, leaf mold, rotten wood, litter sifting, 1 imm. (CAS 9004924); *Parc National de Tsimanampetsotsa*, 6.7 km 130° SE Eloetse, spiny forest/thicket, beating low vegetation (24.10056°S, 43.76°E, 25 m), 18–22/III/2002, 1 imm. (CAS 9005043); *Ranobe*, spiny forest thicket, sifted litter with leaf mold and rotten wood (23.03417°S, 43.61194°E, 30 m), Frontier Wilderness Project, 5–9/II/2003, 1 imm. (CAS 9065075).

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LITERATURE CITED

- Fage, L. 1945. *Arachnides cavernicoles* nouveaux de Madagascar. *Bulletin du Muséum National d'Histoire Naturelle de Paris* 17: 301–307.
- Gray, M. R. 1995. Morphology and relationships within the spider family Filistatidae (Araneae: Araneomorphae). *Records of the Western Australian Museum* 52: 79–89.
- Legendre, R. 1971. Deux nouvelles araignées Filistatidae cavernicoles de Madagascar: *Andoharano milloti* n. sp. et *Andoharano monodi* n. sp. *Bulletin du Muséum National d'Histoire Naturelle de Paris* 13: 645–650.
- Lehtinen, P. T. 1967. Classification of the cribellate spiders and some allied families, with notes on the evolution of the suborder Araneomorpha. *Annales Zoologici Fennici* 4: 199–468.
- Magalhaes, I. L. F., and M. J. Ramírez. 2017. Relationships and phylogenetic revision of *Filistatinella* spiders (Araneae: Filistatidae). *Invertebrate Systematics* 31: 665–712.
- Remillet, M. 1973. Aperçu de la faune souterraine à Madagascar, PP. 135–160 IN: T. Orghidan, editors. Livre du cinquantenaire de l'Institut de Spéléologie "Émile Racovitza." Bucharest: Editura Academiei Republicii Socialiste.
- Simon, E. 1901. *Filistata grandidieri*, sp. nov., araignée cavernicole de Madagascar. *Bulletin du Muséum National d'Histoire Naturelle de Paris* 7: 67.
- [WSC] World Spider Catalog. 2018. World Spider Catalog, version 19.0 [Internet]. Bern, Switzerland: World Spider Catalog Association and Natural History Museum of Bern [cited 28 July 2018]. Available from: <http://wsc.nmbe.ch>. doi:10.24436/2
- Zonstein, S., and Y. M. Marusik. 2015. The first record of *Andoharano* Lehtinen, 1967 (Araneae: Filistatidae) from mainland Africa. *African Invertebrates* 56: 483–489.

Photo on the front cover:

Andoharano decaryi, female lectotype, habitus, dorsal.

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